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ALASKA AGRICULTURAL EXPERIMENT STATIONS

Under the supervision of the
UNITED STATES DEPARTMENT OF AGRICULTURE

**REPORT OF THE ALASKA
AGRICULTURAL EXPERIMENT
STATIONS**

1921



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ALASKA AGRICULTURAL EXPERIMENT STATIONS, SITKA, KODIAK, RAMPART, FAIRBANKS, AND MATANUSKA.

[Under the supervision of the States Relations Service, United States Department of Agriculture.]

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LETTER OF TRANSMITTAL.

ALASKA AGRICULTURAL EXPERIMENT STATIONS,
Sitka, Alaska, February 23, 1922.

SIR: I have the honor to submit herewith a report of the work of the Alaska Agricultural Experiment Stations, 1921.

Very respectfully,

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Agronomist in Charge.

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Publication recommended.

A. C. TRUE, *Director.*

Publication authorized.

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¹ Died December 28, 1921.

CONTENTS.

	Page.
Summary of work at the stations.....	1
Introduction.....	1
Matanuska Station.....	2
Pasture land.....	3
Fairbanks Station.....	3
Rampart Station.....	4
Hybrid grains.....	5
Oats.....	5
Barleys.....	5
Kodiak Station.....	6
Kalsin Bay.....	6
Enlargement of Kodiak Station.....	6
Cattle.....	6
Sheep.....	7
Report of work at Sitka Station.....	7
Weather conditions.....	7
Vegetables.....	7
Small fruits.....	13
The orchard.....	13
Potatoes.....	13
Ornamentals.....	14
The greenhouse.....	15
Report of work at Matanuska Station.....	16
Weather conditions.....	16
Plowing.....	16
Clearing land.....	16
Grain crops.....	16
Winter grains.....	17
Rye.....	17
Wheat.....	17
Spring grain.....	17
Wheat.....	17
Oats.....	18
Barley.....	19
Legumes.....	20
Root crops.....	21
Vegetables.....	21
The nursery.....	22
Livestock.....	22
Report of work at Fairbanks Station.....	23
Weather conditions.....	23
General crop work.....	24
Grain crops.....	24
Oats.....	24
Barley.....	26
Spring wheat.....	28
Potatoes.....	28
Root crops.....	29
The garden.....	29
Alfalfa.....	30
Buckwheat.....	30
Small fruits.....	30
Cooperative work.....	31
Flowers.....	31
Livestock.....	31
Tanana Valley crop production.....	32

	Page
Report of work at Rampart Station.....	33
Weather conditions.....	33
Crop work.....	34
Legumes.....	35
Temporary experimental plats.....	36
Winter grain.....	36
Rye.....	36
Spring grain.....	36
Wheat.....	36
Oats.....	38
Barley.....	40
Hemp.....	42
Flax.....	42
Potatoes.....	43
Vegetables.....	43
Small fruits.....	43
The garden.....	44
Flowers.....	44
Report of work at Kodiak Station.....	44
Weather conditions.....	44
Hay and silage making.....	45
Natural restoration.....	45
Cattle.....	45
Sheep.....	46
Addition to Kodiak reserve.....	46
Reports from seed and plant distribution.....	47
Weather reports.....	49

ILLUSTRATIONS.

PLATE I. Vegetables grown at Sitka Station, 1921.....	12
II. Long Bunch Holland red currants grown at Sitka Station, 1921.....	12
III. Seedling potatoes grown at Sitka Station, 1921.....	12
IV. Fig. 1.—Perennial phlox, Sitka Station, 1921. Fig. 2.—Iceland poppies, Sitka Station, 1921.....	12
V. Fig. 1.—Superintendent's cottage, Matanuska, 1921. Fig. 2.—Gathering raspberries at Matanuska Station.....	20
VI. Fig. 1.—Thrashing, Matanuska Station. Fig. 2.—Filling silo, Matanuska Station.....	20
VII. Fig. 1.—Harvesting barley, Fairbanks. Fig. 2.—Tobacco growing at Fairbanks Station.....	36
VIII. Experimental grain plants.....	36
IX. Fig. 1.—Spring wheat, Rampart Station. Fig. 2.—Barley, Rampart Station.....	44
X. Fig. 1.—Purebred Galloway cow. Fig. 2.—Crossbred heifer.....	44
XI. Fig. 1.—Crossbred heifer. Fig. 2.—Crossbred bull calf.....	44
XII. Fig. 1.—Three-quarters crossbred bull calf. Fig. 2.—Three-quarters crossbred bull calf.....	44

REPORT OF THE ALASKA AGRICULTURAL EXPERIMENT STATIONS, 1921.

SUMMARY OF WORK AT THE STATIONS.

By C. C. GEORGESON, *Agronomist in Charge.*

INTRODUCTION.

This is the twenty-fourth report of the work of the Alaska Agricultural Experiment Stations. The first station was established in 1898 at Sitka, the present headquarters, on land that had to be cleared, broken, and put in condition for culture. Tracts offering special advantages for experiment work were later selected for the establishment of branch stations, and buildings were erected at Kodiak, Kenai, Rampart, Copper Center, Fairbanks, and Matanuska, in the order named. Alaska is a large Territory of widely varying physiographic and climatic conditions, and stations were therefore established in regions which seemed to be representative in a large way of these varied conditions. When the work was first undertaken there were practically no white people in the interior except those living at a few trading posts. As placer camps became centers of settlement experiment stations were established at some of them. Rampart was a placer camp when the Rampart Station was established there, and Fairbanks, which now depends upon agricultural industry for its main support, was a mining camp.

Still remaining to be explored agriculturally are large, promising tracts in the upper Tanana and its tributaries, in both the upper and lower Yukon, in the valley of the Nushagak, and especially in the large valley of the Kuskokwim and its tributaries. Stations should be established in these regions in order that the settlers may become acquainted with the crops which they can most successfully raise. The efforts of the stations have been confined to the region south of the Arctic Circle. The far North should be investigated, as there is every reason to believe that early maturing crops, legumes, berries, and flowers will make thrifty growth as far north as latitude 68°. The stations have developed crops in latitude 65° 30', and have distributed seed to settlers much farther north.

A hardy breed of domestic cattle other than the reindeer should be developed in Alaska, and systematic breeding should be undertaken with sheep, yak, and cattle from the most northern regions and from high plateaus. The summer pastures are abundant in Alaska and produce enough feed to keep animals throughout the winter.

The possibilities of the useful development of the work of the stations are very great. As agriculture in its broadest scope is developed, Alaska doubtless will become settled with a permanent population.

MATANUSKA STATION.

The Matanuska Station suffered a severe loss in the death on December 28, 1921, of F. E. Rader, the assistant in charge of the station. Mr. Rader came to the Sitka Station in 1900, and in 1904 was given charge of the Rampart Station, which he developed in a remarkably short time. His death removes from the staff of the Alaska stations a most efficient and successful worker.

The station now has under cultivation a total of 65 acres.

The large cattle barn, described in last year's report, was completed during the year.

The Milking Shorthorn cattle, which were shipped to the station from Iowa a year ago, are readily adapting themselves to the region. Two heifers and two bull calves were dropped during the year. The former will be kept for breeding purposes and the latter will be sold. In the fall of 1921 five Galloway heifers and a young Galloway bull were shipped from Kodiak to be wintered. The bull and two of the heifers will be sent to Fairbanks in the spring for crossbreeding with the yak, and a few Galloways will be kept at Matanuska in order that a study may be made of their adaptability to the region. The 15 head of ewes and ewe lambs, shipped from Kodiak in the fall of 1920, have done well at Matanuska and will be bred to a purebred Cotswold ram, which was purchased in Idaho.

A number of crops were grown for experimental purposes during the past season, and a small patch of winter rye, seeded in August, 1920, was harvested the latter part of August, 1921, having fully ripened. Experiments at the different stations with winter rye have demonstrated that it will not mature early enough in Alaska to permit of the use of the seed for planting the same year it is harvested. Sown early in August, the crop will be mature toward the latter part of the next August. It has been amply demonstrated that winter rye can be successfully grown at all the stations in the interior. This crop is not damaged by the cold unless the wind blows the ground bare of snow during the coldest weather.

Of the 29 varieties of spring grain tested at Matanuska during the year, the hybrids produced at the Rampart Station give promise of being the best for Alaska. Varieties introduced from Canada have been failures with only one exception. It is thought that the Matanuska Valley is not any better suited to grain growing than Fairbanks, although it is 3° farther south than the latter. The heavy rainfall at the head of Cook Inlet, especially in the fall of the year, retards the maturity of the grain, and early varieties of spring wheat, barley, and oats mature later at Matanuska than they do in the Tanana Valley. The growing season is longer at Matanuska than it is in the Tanana Valley, and it is with difficulty that the crop is saved. The Matanuska region is best suited to mixed farming in which sheep and cattle play an important part. Dairying is the form of farming needing emphasis, more especially since cattle do well in the valley, and milk, butter, and cheese can now be readily distributed over a wide area.

Since the growing of legumes for feed and for the improvement of the soil will necessarily become an important feature of mixed farming, the station will emphasize the value of this work in the near future.

Grimm alfalfa has survived the winter, but it is not known yet whether it will be of permanent value for Matanuska. The yellow-flowered alfalfa, the seed of which was grown at Rampart, will be tested to determine its adaptability to the climate. White clover does well at Matanuska, but red and alsike clovers have not been tested sufficiently to permit of the drawing of conclusions upon their merits.

PASTURE LAND.

During the year several hundred pounds of grass seed were scattered in open patches in the woods for the purpose of establishing a pasture for the live stock. Out of 880 acres in the reservation at Matanuska, less than 200 are level enough to be cleared and put under cultivation. The rest, which will be used for pasture, consists to a large extent of low, rocky ridges and ravines that are covered with scrub timber and brush. This part of the reservation abounds in small lakes.

FAIRBANKS STATION.

M. D. Snodgrass, in charge of Fairbanks Station, resigned, effective June 30, 1921. Having been with the station for 14 years, Mr. Snodgrass was well qualified to carry on the work of which he was in charge. It was largely through his efforts that an active agricultural association was formed among the farmers of the Tanana Valley and that the flouring mill now in operation at Fairbanks was purchased and erected by the association.

G. W. Gasser, who had so efficiently superintended the work of the Rampart Station since 1907, was appointed to succeed Mr. Snodgrass at Fairbanks. Mr. Gasser will continue his very important work, begun at Rampart, of hybridizing grain and producing new varieties.

The work at Fairbanks was successfully carried on during the year and all early crops matured, notwithstanding the frost-free period was only 95 days. Station hybrid barley No. 19, which is by far the best variety of barley so far produced in Alaska, matured in 80 days from seed. As rapidly as it is produced, seed of this hybrid will be distributed for general culture in Alaska, and it is expected to replace all older barleys. The hybrid has stiff straws, long, beardless heads, and hull-less grains. It yields well, does not lodge readily, and is well adapted to the northern latitudes.

Station hybrid spring wheat No. 30a, which is the result of a cross between Siberian No. 1 and Marquis, is the best wheat, all things considered, that has been produced in Alaska. This variety was seeded June 1 and harvested September 2, requiring 93 days for maturity. It will be grown in increase plats for the production of seed for distribution. Since wheat promises to be the leading grain crop of the Tanana Valley, it is important that there should be established a variety which will yield well, mature early every season, and possess the desirable characteristics of Marquis. The wheat now most extensively grown in the Tanana Valley is known as Siberian No. 1 (Chogot), to indicate the place of its origin. It has the important merit of maturing early, but has small heads and kernels, and is bearded. This variety was introduced from Siberia about 10 years ago, when the station was searching for early grains,

and it is now in general cultivation in the Tanana Valley. Wheat on the experimental plats at Fairbanks matured in 86 days in 1921. In interior Alaska the time required to mature a crop depends largely upon three factors—season, exposure, and the amount of moisture available for the crop. A warm, dry summer is conducive to early maturity, and a crop that is raised on the south slope will mature earlier than one raised on the north slope. A wet season prolongs the growing period and always delays maturity.

Maintenance of soil fertility is rapidly becoming a problem needing solution among the farmers of Fairbanks, more especially now that the land is continuously cropped in grain and barnyard manure is not available in quantity for use as a fertilizer. Since the natural maintenance and increase of fertility can be brought about only by growing and plowing under green-manure crops, particularly legumes, the station has undertaken a series of rotation experiments with peas, alfalfa, and clover for this purpose. The experiments have not yet been completed, but it is noted that the yield from land on which green-manure crops have been plowed under is better than that from untreated areas. The station recommends the planting of at least 10 or 15 acres to the early maturing varieties of field peas, Alaska and McDonald for seed, and the plowing under of the crops when they have made their maximum growth, usually about mid-August.

Artificial fertilizers were tried on potatoes during the year to determine their effect on yield and quality. A decided increase in yield was had as the result, but it is thought that equally profitable yields and fine quality of potatoes can be had at less expense by the growing of legumes as green-manure crops.

RAMPART STATION.

The past season was unfavorable for crop growing in some respects. The precipitation of June was heavier than normal, and was followed the greater part of July by a severe drought which was broken by violent thundershowers that started the grain crops to tillering anew. Notwithstanding the drawbacks, two small fields of spring wheat, Siberian No. 1 (Chogot), matured from seed in approximately 94 days. Had it not been for the rains of July and August, this wheat would have matured earlier than it did. Other grain crops also matured in about the average length of time between seeding and harvesting, but owing to the drought of early July the yields were light. There is no question about the successful growing of grain in the Yukon Valley.

Hardy alfalfa is the second crop of importance in Alaska. Ten acres of alfalfa matured about 30 pounds of seed during the year. It was partly spoiled and maturity was delayed by the inclement weather of July and August.

The hardy vetch (*Vicia cracca*) was also a success. Seed of this crop is sparingly matured, but enough can be gathered annually to permit of the gradual extension of the plantings. This vetch has been grown exclusively for seed at the station, but it makes a palatable, nutritious forage that stands from 2 to 3 feet high.

HYBRID GRAINS.

In Alaska all grains vary in the length of time required for maturity, not only with the seasons but also with the soil and the location of the plat. A southern exposure always hastens maturity. Varieties that are grown on comparatively rich ground take a longer time to mature than do varieties raised on less fertile soil, and kernels that are planted far apart, so as to give them room to tiller and rapidly produce seed, take longer to mature than do those sown under ordinary field conditions. The three most promising hybrid wheats for Rampart are Nos. 30a, a cross between Siberian No. 1 and Marquis; 63, a cross between Siberian No. 1 and Romanow; and 64, a cross between Siberian No. 1 and Ladoga. The early Siberian mother variety has imparted its earliness to these three crosses, which however, vary according to the conditions noted above.

At Fairbanks hybrid No. 30a matured in 80 days, and at Rampart it matured in 102 days. Hybrids Nos. 63 and 64 each matured in an average of 94 days for the several plats. The station has at last established varieties of spring wheat that are early enough to mature in interior Alaska and that will be better yielders than the imported Siberian No. 1 variety. Several introduced varieties, including Wisconsin Wonder or Prelude, durum, and Early Triumph, the last of which was tried for the first time, matured too late to be depended upon for crops.

OATS.

Hybrid No. 51, which is a cross between a hull-less, multiflorous white oat, and Norwegian, a black oat grown at Rampart for some years, partakes of the quality of both parents. Norwegian matures early enough at Rampart in normal summers, while the Hull-less does not mature every year unless it is grown in favorable locations and on favorable soil. The hybrid is earlier than the mother parent, Hull-less, and is stronger and sturdier than the staminate parent, Norwegian. It matured August 22, which is early enough for any crop. The several types of this cross have not yet fully established themselves. Some have white seed like the mother parent, some have black seed like the Norwegian, and others are intermediate. They will be tested on a field scale when more seed becomes available.

BARLEYS.

The best hybrid barley for Rampart is No. 19, which is a beardless and hull-less variety having stiff straw and upright heads. It grows to a good height, yields well, and matures early enough for interior Alaska. It gave excellent results during the year at Fairbanks, and a small plat, seeded May 12, was harvested 96 days after seeding, at Rampart. Hybrid No. 20 matured in 85 days, but it is inferior to hybrid No. 19. Hybrid No. 14, another very promising variety, is a cross between the mother parent, Hull-less, a beardless, hull-less, 6-rowed, and medium-early barley, and the staminate parent, Abyssinian, a bearded, black, 2-rowed, and early maturing barley. Of the many variations produced by this cross, two types have been established. These have white grain like the mother. One is 2-rowed, taking no other characteristic from the staminate parent,

vigorous, produces long heads, and is beardless and white; the other is similar to it, except that it is 6-rowed. These hybrids will be grown on a field scale at Fairbanks as soon as seed becomes available, so that they can be thoroughly tested.

KODIAK STATION.

Cattle and sheep breeding progressed at the Kodiak Station as heretofore. The cattle were again tested for tuberculosis, but none reacted, nor was any suspected of having the disease. It is certain that the disease, which was discovered in the herd in 1916, has been completely eradicated. Before closing the chapter on tuberculosis, it is desirable to again emphasize the fact that healthy calves can be raised from tuberculous parents. Several years ago the herd bull and a number of cows which reacted were isolated at Kalsin Bay. They were apparently healthy animals, but were condemned because of their rise in temperature when given an injection of tuberculin. These animals, although isolated, were bred as they would have been normally, and dropped 11 calves. These were immediately separated from their dams and fed on sterilized milk taken from the reacting mothers. No reactors were found among the young animals after a period of two years.

KALSIN BAY.

Owing to the lack of transportation facilities and the inadequacy of funds needed for the maintenance of the work, it has been deemed advisable to temporarily close the breeding station at Kalsin Bay and to confine efforts along breeding lines to the station at Kodiak. This branch station has accomplished the work for which it was established, and can be reopened at any time that the development of the country or of southwestern Alaska justifies the increase of purebred animals for selling to stock raisers.

ENLARGEMENT OF KODIAK STATION.

The original reservation of 160 acres at Kodiak was reduced to 134 acres by the General Land Office, leaving the station with an area that was wholly inadequate for live-stock breeding work. A request for the reservation of Near Island was granted, giving to the station an additional 200 acres of very rough pasturage which is suitable for sheep and calves, but not for breeding cattle. A further increase was applied for and officials from the Land Office surveyed the land in the summer of 1921, but the survey has not been approved.

CATTLE.

Owing to the curtailment of expenses at Kalsin Bay the herd was reduced by the sale of stock to butchers. At present the station has 10 purebred Galloways headed by the bull Ranger of Seven Oaks, and 6 Holsteins, the herd bull of which was recently accidentally killed. There are in addition 16 animals of all ages, which are the progeny of crosses between these two breeds. This is about as large a herd as can be cared for until facilities are increased. The cattle have done well and it has been proved that cattle breeding can be made a success in southwestern Alaska.

SHEEP.

The flock of sheep was reduced last summer when 10 ewe lambs and 5 young ewes were sent to the Matanuska Station. At present there are at Kodiak 1 purebred Lincoln ram, 21 grade ewes, 10 grade ewe lambs, and 9 grade wether lambs. Recently 9 of the station's sheep were killed by dogs.

It has been shown that sheep can be successfully raised in southwestern Alaska. Only long-wooled sheep, however, such as the Lincoln and Cotswold breeds, are suitable to the climate. Fine-wooled sheep are more at home and do better in a dry climate. The fine wool holds moisture like a sponge at Kodiak, where there is much rain, and the animal is handicapped by having to carry a weight of water until it has been evaporated by the body heat. Long-wooled sheep, on the other hand, shed the rain readily and do not suffer as do the fine-wooled sheep.

REPORT OF WORK AT THE SITKA STATION.

By C. C. GEORGESON, *Agronomist in Charge*, and H. LINDBERG, *Horticulturist*.

WEATHER CONDITIONS.

Weather conditions at Sitka were unfavorable during the spring and summer. From April to the end of August there were 99 rainy days and only 24 clear ones. The temperature did not average as high as it does in favorable years. Such conditions naturally had an effect on garden crops.

VEGETABLES.

Cabbage, cauliflower, kale, and Brussels sprouts, in the order named, are the most important members of the Cruciferae family raised for their leafy tops. Thriving well in a cool, moist summer, these vegetables did well the past year at the station. Some of the salad plants and root crops did very well, despite inclement weather. (Pl. I.)

Beans.—Common garden beans do not do well at the Sitka Station. The summers are hardly warm enough for them. A variety of horse bean, obtained from the United States Department of Agriculture and grown at the station, developed stiff stalks $2\frac{1}{2}$ to 3 feet high. They began to bloom July 10 and set a wealth of pods which did not reach full size until cold weather. All varieties of beans do better in the interior than they do in the coast region.

Beets.—The varieties of beets grown the past summer were Early Eclipse, Half-Long Blood, the Market Gardener, Detroit Dark Red, Early Blood Turnip, Mammoth Long Red, and Early Egyptian. Early Eclipse and Early Egyptian were the best in flavor, but all varieties did fairly well. Those with the short globular root seem to be better adapted to Alaska than do the long-rooted sorts. Garden beets do not always do well in Alaska. Like spinach, they are apt to run to seed immediately instead of developing root. This is true especially if the soil is wet and cold, and they amount to nothing on

poor soil. On warm, well-drained, rich soil having a southern exposure beets will do fairly well.

Swiss chard or spinach beet.—A few plants, the seed of which was sown in the open on May 17, made splendid growth and produced large, succulent leaf stems. Swiss chard is an excellent vegetable for use as a salad.

Broccoli.—This vegetable is a variety of cauliflower. Only two varieties, Early White St. Valentine and Improved, were tried at the station during the year. The plants were set in the open on May 16, being treated as cauliflower. The heads produced were firm and nearly equal in value to cauliflower.

Brussels sprouts.—This valuable green is not fully appreciated in Alaska. The buds in the axils of the leaves develop into small heads which form the edible portion of the plant. The plants should be raised, transplanted, and treated exactly like cabbage. They can stand light frosts and may be left out, at least in the coast region of Alaska, until covered by snow. The varieties grown at the station were Burpee's Danish Prize, Long Island Improved, and Perfection.

Cabbage.—The varieties of cabbage grown at the station were Copenhagen Market, Early Dwarf Flat Dutch, Early Jersey Wakefield, and Succession. The seed was sown in the greenhouse on March 23. When they were large enough the plants were moved to cold-frames to be hardened, and May 11 they were planted 2 feet apart in rows 3 feet apart. All made splendid growth. Copenhagen Market was the largest variety grown, and several of the heads weighed over 30 pounds. Tar-paper shields were again used to protect the plants from root maggots. Plants showing signs of drooping, indicative of root-maggot attack, were treated with very strong lime-water, one pail of slaked lime being used to a barrel of water. The treatment was repeated a week later, and while it kept the pests in check it did not kill all the worms.

Carrots.—This vegetable is grown in every garden patch in Alaska. The varieties grown at the Sitka Station were New Coreless, Scarlet Horn, Oxheart, Improved Long Orange, New Yellow Giant, White Belgian, Danvers Half-Long, Chantenay, and Improved Short White, the seed of which was sown in the open on May 11. The plants began to come up May 18 and made rapid and satisfactory growth. Carrots can be pulled and used as soon as the roots are large enough. The seed must be sown thinly, and if the plants come up too close together they should be thinned. Early Scarlet Horn is a small variety usually intended for early use, and Chantenay is another excellent sort. Chantenay and Danvers Half-Long were the best varieties for culinary use. New Yellow Giant and White Belgian, grown for trial for horse feed, were satisfactory for that purpose.

Celeriac.—This is a turnip-rooted celery and belongs to the salad plants. It is a variety of celery developing a large, crisp, bulbous root which is the edible portion of the plant. Only one variety was grown at the station during the year, being treated like celery, except that it was not planted in trenches. The largest roots were only 3 inches in diameter. Celeriac is a favorite vegetable in northern Europe.

Celery.—Celery can be grown to perfection in Alaska, provided it is planted in a rich soil and given careful cultivation. The seed is

very small and should be sown on the surface of the moist soil in flats in late March, and covered with paper until it begins to sprout. When the plants are about an inch high they should be pricked out 2 inches apart in flats and allowed to grow until they are ready to set in the open. They should not be chilled by exposure to low temperature. Giant Pascal, White Plume, Golden Self-Blanching, and Winter Queen were the successful varieties grown at Sitka during the year. Trenches, prepared on a patch of rich soil, were dug 20 inches deep and filled to a depth of 6 inches with manure which was spaded into the bottom, and the surface was then leveled. The seed was sown March 23. The young plants were transplanted to flats about the middle of May, the flats being placed in coldframe so that the plants could harden. June 1 the plants were set out in the trenches, being set zigzag 8 inches apart. As the plants grew the soil was filled in and heaped up around them to blanch the whole stem. All varieties made vigorous growth, but Winter Queen took the lead and developed into stalks 30 inches long. White Plume was next in height, producing crisp, tender stalks of marketable size and unusually fine quality. Golden Self-Blanching was ready for use by September 1. On October 13 the crop was dug and stored in a field house.¹

Cucumbers.—Cucumbers can be grown in the coast region only under glass. In the interior, where the summers are warmer, they can be grown outdoors with moderate success. Seed of English Frame was sown April 7 in the greenhouse and the young plants were placed in coldframes June 18. Green cucumbers were ready for use by July 28.

Cauliflower.—The varieties Mount Hood Early Snowball, Danish Giant, and Early Snowball were grown during the year. The plants were raised and set out like those of cabbage, but were placed 1½ feet apart in rows 2½ feet apart. All did well and Danish Giant produced the largest heads. Early Snowball was ready for use by July 15, but the other varieties did not come in until August.

Kale.—This is a vegetable that deserves to be much more generally cultivated. It makes a most delicious green for fall and early winter, but is not grown to a great extent because many housekeepers do not know how to use it. The leaf should be stripped from the midrib, cut up coarsely, and boiled for two hours with either salt pork or corned beef, preferably the former. This excellent vegetable should be grown in every garden in Alaska. It withstands considerable frost. The varieties Dwarf Green Curled and Dwarf Siberian made remarkable growth at the station during the year. The plants are sown and treated like cabbage, except that the rows need not be more than 2½ feet apart and the plants 1½ feet apart in the row. Kale is not attacked by root maggots and is not subject to any disease.

¹ A field house should be constructed on a dry spot in the field where the celery is grown. The ground should be dug to a depth of 12 inches and a rough board shelter built over it. The plants should be raised and very closely packed under this shelter, but the roots and the soil must not be disturbed any more than is absolutely necessary. After all the plants are in, the roof can be completed. This should be covered first with tar paper to shed rain and then, as the weather grows colder, with earth to a depth of 1 or more feet. Seaweed or other litter will make the house frost proof. At each end of the house a small opening should be left until the advance of cold weather and then be closed. A removable door at one end will enable the planter to crawl in at will.

Kohl-rabi.—This vegetable belongs to the cabbage family. The bulb, which is formed by the stems at the surface of the ground, is the edible part. It should be used while young, because it becomes hard and woody with age. Kohl-rabi is intermediate in character between cabbage and turnip. It is subject to attack by root maggots and must be protected from them. Kohl-rabi is ready for use early in July. Early Purple and Early White varieties did well at the station during the year.

Lettuce.—Lettuce is the principal salad plant of Alaska. Like radishes, lettuce can be sown to form a succession of crops. The earliest should be sown in flats in a greenhouse in window boxes, or in a coldframe. When the plants are an inch high they should be thinned to 2 inches apart and transplanted to flats or boxes. After being hardened off they can be planted in the open about May 15. Seed can be sown in the open two or three weeks apart from that time on, and the tops can be cut and used when they are ready. The loose-leaf varieties are the early ones and are better for this purpose than are the solid types, which require a longer time to form heads suitable for table use. Since practically all varieties do well in Alaska, it is suggested that the owners of gardens send to seed houses for catalogues from which to make selections. The varieties grown at the station were Crispette, May King, and Simpson's Early Curled. May King was the best of the three.

Melons.—Hanson's Siberian muskmelon, Royal Governor, and Manchester, which were grown at the station, produced no fruit of marketable size. They suffered from lack of sunshine and dropped most of their blossoms without setting fruit, although efforts were made to pollinate them by hand. In the interior excellent muskmelons can be grown under glass.

Onions.—Onions are not a success anywhere in Alaska, yet nearly everybody tries to grow them. White Portugal, Large Weatherfield, and Australian Brown were sown in flats in the greenhouse on April 7 and were planted 6 inches apart in rows 2 feet apart in the field on May 18. Yellow Globe Danvers, Oregon Yellow Danvers, White Globe, Prizetaker, and Australian Brown were sown in the field. The varieties that were started in the greenhouse produced very fair-sized onions, but those seeded in the open did not form any bulb. Seed should be planted in the greenhouse or hotbed, and when they are 5 or 6 inches high the plants should be transplanted to a well-prepared soil. If sown direct in the open the seed should be put in as soon as frost is out of the ground, whether this be in April or in May.

Chives.—Chives or grass leek is a perennial and has been grown at the station for several years. The plants produced splendid growth and tops that could have been cut continually.

Shallots.—This variety of branching onion does well in this climate. The bulbs grow in little clusters just below the surface of the soil. In order that these onions may be propagated the bulbs should be planted individually, being set 4 inches apart in the row. They will keep over winter in the root cellar and should be set out among the earliest plantings made in the spring. Shallots are a more certain crop than are onions raised from seed, and they make a good substitute for the larger onions.

Perennial-Top onions.—This variety of onion can be left in the open all winter. It sends up a stalk 3 feet high and produces at the top a small cluster of onions which are used for flavoring or for propagation.

Parsley.—This vegetable belongs to the salad plants, although it is used chiefly for garnishing. Extra Double Curled was sown in the greenhouse on April 9, and was planted in the open on May 12. It can, however, be sown in the open ground among the earliest things planted. Since the seed germinates slowly, it should be started in a warm place. Parsley does exceptionally well in all parts of Alaska. On rich soil it produces a wealth of green, crisp, curly leaves. A row 4 feet long is sufficient to supply the ordinary family. In the fall the roots can be taken up, planted in boxes, and kept in the house, or they can be planted on a bench in the greenhouse to keep the family supplied with fresh parsley all winter.

Parsnips.—Hollow Crown and Early Half-Long produced small roots during the year and were not as tender as those grown in more southern latitudes. Hollow Crown was the better of the two varieties. Parsnips must be thinned so as to give them ample room in which to develop normal roots.

Peas.—All varieties of peas do well in Alaska. Alaska, Gradus, Little Marvel, American Wonder, Premium Gem, Yorkshire Hero, Laxton, Stratagem, Mammoth Melting Sugar, and Dwarf Telephone did exceptionally well at the station, but Gradus and Stratagem were the most desirable. Among the late-maturing peas Mammoth Melting Sugar and Dwarf Telephone gave excellent results.

Three or four varieties should be planted in each garden so that the early maturing varieties can readily be determined and selected for permanent plantings. They should all be planted at the same time, preferably in late May, and should be provided with supports of either brush, strings, or wire netting if they grow more than 2 feet high. Some late-maturing varieties grown in rich soil reach a height of 8 or 9 feet and must be supported with brush or netting. The variety Alaska is perhaps the earliest maturing pea in Alaska.

Radishes.—In Alaska the radish is always seeded in the open ground in early spring. For early use it should be grown in the greenhouse or in a coldframe, and if a constant supply is wanted it should be sown in short rows every two weeks and covered with about a quarter of an inch of soil. The plants run to seed if the roots are not used as soon as they are ready for table use, and the seed only rarely matures in Alaska. They may be sown with carrots or with parsnips to mark the rows, but when ready for use, usually about three weeks after planting, they should be pulled to make room for the carrots. Varieties forming small, round roots are ready for table use earlier than the long-rooted sorts. French Breakfast, a favorite, is oblong in shape, and the lower part is white and the upper red. During the year the varieties doing well at the station were Early Snowball, Early Crimson, Scarlet Turnip, White-Tipped Scarlet, White Icicle, and Long Scarlet.

Horse-radish.—The horse-radish makes hardy growth in all parts of Alaska. The roots do not attain any size unless they are properly cultivated. Long, slender roots no thicker than pipestems should be planted on a raised bed in holes at an angle of 45°. Only

the upper end should protrude from the soil, which should be firmed around it. The plant will produce a fairly thick root if the soil is rich and the summer is warm.

Rhubarb.—Rhubarb is thoroughly at home in Alaska. Like horse-radish, it is hardy everywhere, and continues to send up large, tender stalks from the same root year after year. The secret of growing large rhubarb is to fertilize the ground very heavily. Some stable manure should be placed on the plant in the fall. The rains will wash the soluble portion into the ground. Additional manure should be spaded about the plant in the spring. At the station stalks 3 inches in diameter and 3 feet in length were produced during the year.

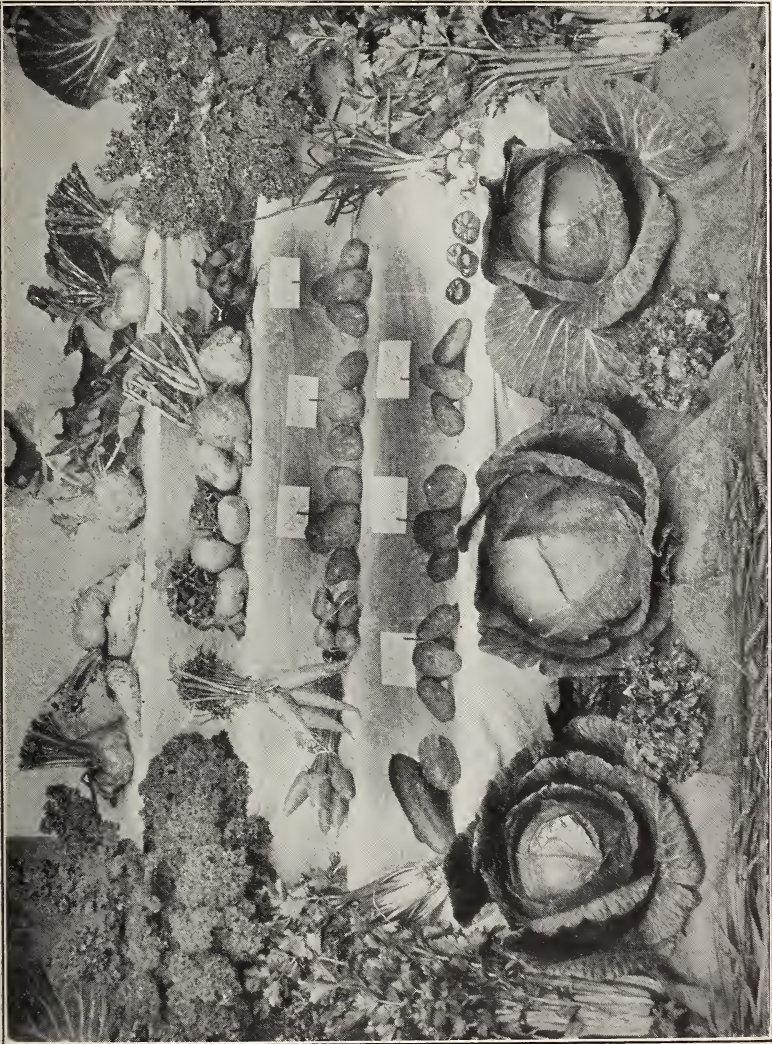
Rutabagas.—On May 11 the varieties Improved American and Danish Purple Top were sown at the station in the open, the plants being set 9 inches apart in rows $2\frac{1}{2}$ feet apart. Root maggot attacked the plants, 80 per cent of which made a normal stand after being given frequent applications of strong limewater. Danish Purple Top was the better of the two varieties tested.

Salsify.—The variety Mammoth Sandwich Island made a fine growth and developed into medium-sized, well-shaped roots.

Spinach.—This vegetable nearly always runs to seed without producing much of a crop of leaves. It is at home in a more southern climate than Sitka. Seed of the varieties Savoy-Leaved and Improved Thick-Leaved was sown in the open on May 17, but the plants ran to seed without producing any greens.

Tomatoes.—Seed of the varieties Bonny Best, Carter's Sunrise, Comet, and Livingston's Globe was sown in small pots on March 21, and the plants transplanted to the bed in the greenhouse on May 30. They were trained to a single stem and made a very vigorous growth. Comet and Livingston's Globe made the best showing, producing large clusters of good-sized, well-shaped tomatoes. This shows that tomatoes can be grown successfully under glass in the coast region. In the interior, where there is more sunshine, they are grown under glass for early use, and plants grown in pots until they show bloom are planted in the open about June 1.

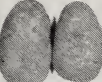
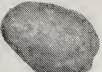
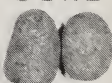
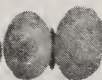
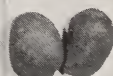
Turnips.—Turnips should be seeded in the open ground in early spring. For quality the Petrowski outranks all other varieties tried in Alaska. Seed of this variety came from Finland about 20 years ago and can be produced anywhere in Alaska. The root is medium in size, about 5 inches in diameter, is yellow, and has a tough skin. In consistency this variety is solid, crisp, fiberless, and of excellent flavor. The Petrowski is seldom attacked by root maggots or other pests. When plantings are grown for seed they should be set 6 to 8 inches apart on good soil in early June. In the fall, just before frost, roots of uniform size and shape should be packed in moist ground in a cool but frost-proof cellar for planting for seed in the spring. When being planted these roots should be set in rows 2 feet apart each way, and later the seed-bearing stems should be supported by stakes. When the seed ripens the tops can be collected on a tarpaulin or other large piece of canvas to prevent the seed from shattering. It can be beaten out and cleaned in the winter, and will keep for five or six years.



VEGETABLES GROWN AT SITKA STATION, 1921.



LONG BUNCH HOLLAND RED CURRANTS. GROWN AT SITKA STATION, 1921.

Seedlings of
Norway No.1451
BESSIE526
CARRIE550
CASSIESeedlings of
Green Mountain357
ABBIE368
ALIDA414
BERTHA358
AGNES399
ANNA737
EVA361
ALICE401
BELLA720
EMILYSeedlings of
Lookout Mountain1087
JULIA1124
KATE1088
JUNESeedlings of
Spaulding. No.4713
ELLA714
ELSIE754
EVANGELINESeedlings of
Station Crop. 1919963
IDA1006
JEAN1025
JESSIE964
IRENE1009
JEANNETTE1053
JUDITH990
INEZ1036
JOANNA1050
JOSEPHINESeedlings of
Green Mountain X
Spaulding. No.4705
EDITH728
EMMA

SEEDLING POTATOES GROWN AT SITKA STATION, 1921.



FIG. 1.—PERENNIAL PHLOX, SITKA STATION, 1921.



FIG. 2.—ICELAND POPPIES, SITKA STATION, 1921.

SMALL FRUITS.

Currants.—Currants were an unqualified success during 1921, the bushes being laden with fruit. Long Bunch Holland is probably the best variety of currant that has been tried at the station (Pl. II). Other varieties, both black and white, were almost equally as good as Long Bunch Holland. The red currant varieties tried at the station were Long Bunch Holland, Perfection, and Fay (*Fay's Prolific*). The white varieties were White Grape and White Imperial, and the black varieties were Montana (*Black Montana*), Black Naples, and Wales (*Prince of Wales*). The first currants ripened July 10.

Gooseberries.—Like other berries, gooseberries were set for heavy crops, but most of the fruit dropped when cloudy and rainy weather continued. Those ripening were large and sweet, and the skin was thin. Josselyn (*Redjacket*), Portage, Columbus, Industry, Triumph, Champion, and Whitesmith did best of all varieties grown.

Raspberries.—Like strawberries and gooseberries, the raspberries in large part failed to develop. The fruit rotted on the vines or dropped before reaching maturity. Of the several varieties tried at the station, Cuthbert is considered the best.

Strawberries.—About 2,000 different hybrid seedling varieties of strawberries are under test at the station. They are grown as individual plants and those showing exceptional merit are propagated by runners. All varieties made vigorous growth soon after the season of heavy rain, and the first bloom appeared May 19. All varieties bloomed profusely until the beginning of July. Berries were set for an enormous crop, but rainy and cloudy weather caused half of them to rot. Notwithstanding the inclement weather and unfavorable conditions, some of the varieties produced berries of very superior quality.

THE ORCHARD.

Apples.—The fruit of only a few varieties reached the maturing stage. All varieties bloomed freely, but Yellow Transparent, Live-land (*Lowland*) Raspberry, and Keswick (*Keswick's Codlin*) were the only varieties to set any fruit worth mentioning and it did not mature. Siberian crab produced an unusually large crop of apples, which matured sufficiently for use in jellies and preserves.

Pears and plums.—Both made good growth, but neither bloomed.

Cherries.—Cherries bloomed freely, but only a small percentage of the bloom set fruit. Most of the fruit split before ripening. A tree which was trained against the south wall of the main building did remarkably well, being covered with cherries that matured normally. Training trees to grow along the south side of buildings or against walls erected for the purpose has been found to be advantageous in Scandinavia, and the method will be tried at the station for all sorts of fruit trees.

POTATOES.

The season was favorable for the growth of potatoes, and the station never produced a better crop than it did during the year. Tubers from seedlings of 1920 were sprouted in the greenhouse after

those showing signs of potato scab had been treated with a formaldehyde solution. Planting started May 18, whole potatoes being dropped $1\frac{1}{2}$ feet apart in rows $2\frac{1}{2}$ feet apart. June 7 they were above ground, and two weeks later were given their first cultivation. Several of the seedlings produced enormous tops, and one reached a height of nearly 9 feet. Another which sent up tops to a height of 5 feet produced a profusion of purple blooms. All varieties matured too late for seed. The unusual top growth was doubtless due to the use of fertilizers, both seaweed and fish guano having been applied to the soil in which the potatoes grew. Another unusual feature was the production by several varieties of little potatoes in the axils of the leaves. Some of these were as large as pigeon's eggs. Selections will be made from among these varieties for further planting. (Pl. III.)

A number of commercial varieties of potatoes were grown during the year and also some seedlings, the seed for which was obtained from the South Carolina experiment station, will be tested to determine their merits.

ORNAMENTALS.

Shrubs.—All shrubbery made good growth, and some of it, especially Tartarian honeysuckle (*Lonicera tatarica*), produced an unusually fine lot of blossoms. Other shrubs doing well were *L. japonica*, *L. thibetica*, rhododendron, *Hydrangea paniculata*, *Cornus sibirica*, *Ribes sanguineum*, cotoneaster, Siberian pea tree (*Caragana arborescens*), *Diervilla* (*Weigelia*) *rosea*, and *Potentilla fruticosa*.

Herbaceous perennials.—All varieties grown here do well. The perennial border was one mass of bloom and a riot of color. The varieties doing exceptionally well were Lychnis, Shasta daisy (chrysanthemum), oriental poppy (*Papaver orientale*), columbine (Aquilegia), golden feather (*Pyrethrum* sp.), larkspur (*Delphinium* sp.), yellow marguerite (*Anthemis kelwayi*), bleeding heart (*Dielytra spectabilis*), foxglove (*Digitalis purpurea*), lupine (*Lupinus* spp.), peonies (*Pæonia* spp.), phlox (Pl. IV, Fig. 1), meadow sweet (*Spiræa venusta*), and primrose.

Annuals.—Annuals, started in the greenhouse, were planted out on June 1, and gave much better results than was expected. The varieties grown were petunia, lobelia (*Lobelia* sp.), *Clarkia elegans*, snapdragon (*Antirrhinum* sp.), stocks (ten-weeks), zinnia, pinks (*Dianthus* sp.), marigold (*Calendula* sp.), cosmos, cornflower or bachelor's button (*Centaurea cyanus*), *Cobæa scandens*, godetia, candytuft (*Iberis*), everlasting (*Helichrysum* sp.), evening primrose (*Primula* spp.), pansies (*Viola* sp.), *Phlox drummondii*, sweet peas (*Lathyrus odoratus*), asters (*Aster* sp.), mignonette (*Reseda* sp.), coreopsis (*C. lanceolata*), California poppy (*Eschscholtzia californica*), and Shirley poppy (*Papaver* sp.). (Pl. IV, Fig. 2.)

Roses.—The roses best adapted to this climate are those belonging to the *Rosa rugosa* family. They make vigorous growth at Sitka and produce a profusion of large single and double flowers of white and pink colors. A double pink rose (Conrad F. Meyers) did very well this summer and is now considered hardy in this part of

Alaska. It was propagated by layering this year and will be propagated by cuttings next year. About 300 double-red bushes (*R. rugosa*) were rooted and about 1,000 young single bushes were raised from last year's seed. The hybrid varieties do not seem able to live through the winter here. The wood does not ripen enough in summer to withstand the cold of winter.

THE GREENHOUSE.

Propagating and breeding work was confined mostly to young seedlings, several thousand of which, both vegetable and flower, were raised. A large number of cuttings from ornamental shrubs and roses were rooted in the propagating bed, and cuttings were rooted of the varieties *Spiræa salicifolia*, *S. vanhouttei*, *Cornus sibirica*, *Potentilla fruticosa*, *Diervilla rosea*, *Eva Rathke* (*Diervilla*), *Lonicera tatarica*, *L. japonica*, *L. ledebouri*, *Ribes sanguineum*, *R. alpinum*, *Philadelphus* sp., golden bell (*Forsythia* sp.), high bush cranberry (*Viburnum opulus*), *Caragana arborescens*, and double red roses (*Rosa rugosa*).

Florists' stock.—The varieties of florists' stock grown in the greenhouse were *Abutilon*, *Asparagus springeri*, *A. plumosa*, begonia (one variety), bouvardia, calceolaria, cyclamen, chrysanthemum, carnations, cinerarias, gloxinias, geraniums, fuchsias, primulas (in variety), pelargoniums, Impatiens, sweet peas, roses, smilax, and a variety of small greenhouse ferns.

Plant-breeding work.—A number of crosses were made between the wild *Fragaria platypetala* and Yakutat with hybrid strawberry seedlings grown at the station. The crosses were as follows: No. 3653×*F. platypetala*, Trebla×*F. platypetala*, Trebla×No. 1855, Red Cross×*F. platypetala*, Trebla×Yakutat, No. 3653×Yakutat, Red Cross×Yakutat, No. 1855×*F. platypetala*, No. 3653×No. 1855. The Red Cross and Trebla hybrids are from California.

Attempts were made to cross the wild *Rosa nutkana* and the *R. rugosa* varieties with the hybrid roses planted in the greenhouse for that purpose, but the weather conditions were so unfavorable, while the outside roses were in bloom, that only poor pollen could be gathered and the crosses were not a success.

Nursery fruit stock.—The fruit trees planted in the cold house are cherry, peach, and apricot, all three of which were trimmed and trained in fan shape. The peach and apricot trees did not bear fruit, but the cherry trees bloomed and set some fruit which matured. Having no heating system, the station was compelled to use the greenhouse to winter young nursery stock that was rooted during the year. Two varieties of grapes, Caco and Moore's Early, were planted in the house for the purpose of acclimating them before setting them in the open.

REPORT OF WORK AT MATANUSKA STATION.By F. E. RADER, *Assistant in Charge.***WEATHER CONDITIONS.**

The fall of 1920 was unusually dry. From November 1, 1920, to November 1, 1921, the total precipitation (rain and melted snow) amounted to 16.79 inches, 9.3 inches of which fell in August, September, and October, and 3.57 inches in October, usually a good month for curing grain. A few light frosts occurred in early September, but the first killing frost did not occur until October 2. There were no more more frosts until the middle of October. The snowfall of the winter amounted to 35 inches. The minimum temperature for the winter, 26° F. below zero, occurred January 15, and the maximum temperature for the summer, 77° F., was on July 8.

PLOWING.

The dry fall of 1920, while very favorable for the harvesting of the crop of that season, was most unfavorable for fall plowing. When well stored with moisture, fall-plowed ground freezes to such a depth that only a minimum amount of soil is blown away by winter winds. The soil at Matanuska is easily loosened and blown if stirred when dry. On account of the unfavorable weather conditions, it was considered unwise to do much fall plowing for fear that the ground, lacking moisture, would not freeze to any depth and the top soil would be eroded during the winter. This would be fatal to crop production, since most of the available plant food is within a few inches of the surface. Nearly all of the land that was seeded this season had to be spring plowed, causing a further decrease in the supply of moisture. Germination was rather poor in such a dry seed bed, and the plants that came up were retarded in growth. The rather infrequent rains of April, May, June, and July did not assist materially in restoring the normal amount of moisture to the soil; and, in fact, the ground did not become well soaked until after the middle of August, when the annual rainy season set in. The rains came too late to increase production materially, and the yield of both grain and forage amounted to little more than half a normal crop. The fall of 1921 was rather wet for harvesting and many farmers experienced difficulty in saving their grain crops. The usual drying winds failed to come, or if they did blow they were immediately followed by rain.

CLEARING LAND.

The greater part of May, all of June, and the first 10 days of July were devoted to clearing land. This is the best time of the year for clearing burned land, the weather being dry usually and the fireweeds of low growth. A total of 65 acres of land has been cleared to date.

GRAIN CROPS.

Various crops were seeded on 8.5 acres of rented land and 41.5 acres of station ground. Of this area about 12 acres were seeded to grain for seed. (Pl. V, Fig. 1.) The remainder was seeded mostly to oats for silage and for hay. All of the grain that was expected to ripen did so. Seeding began May 3 and continued as rapidly as

the ground could be prepared. It was practically finished by May 27. Later some of the newly cleared land was seeded to oats for silage.

WINTER GRAINS.

RYE.

About 1 acre was seeded to the variety Monster and one-half acre each to Brandon and Hogot on new land on August 14, 1920. The three varieties germinated well and made good growth, notwithstanding the dry weather. Heads appeared June 1 and the crop was ripe by August 20 of this year. The grain has not yet been thrashed, but it gives promise of yielding well.

On August 19, 1921, Rosen was seeded on 3.25 acres of summer-fallowed land that had been in oats during the greater part of the two previous years. This variety is being tried for the first time at the station. The seed did not germinate well, but the plants that came up made good growth.

WHEAT.

A few short rows each of the following varieties were seeded August 14: Kanred No. 2414, Kanred No. 2415, and Kanred No. 5146, from Kansas, Malakof, Turkey Red, Kharkof, and Red Rock. This is the first time that winter wheat has been seeded at the station and the results will be noted with considerable interest.

SPRING GRAINS.

WHEAT.

The variety Romanow, sown May 3 on 2.75 acres, was up May 18 and ripe September 1. It was harvested September 5, when its estimated yield was 12 bushels per acre. Last year this same ground produced 32 bushels of wheat.

On May 4 Siberian No. 1 was seeded on 2.75 acres that grew the same variety last year. The crop was up May 18 and ripe by August 25. It was harvested September 5, when its estimated yield was 10 bushels per acre. Last year this same ground produced 45 bushels per acre. Siberian No. 1 had very short straw this year.

To test their adaptability to conditions here the following varieties of spring wheats were seeded in rows in small plats with a garden drill:

Siberian No. 1 (No. SW133), the seed of which was obtained from the Rampart Station, was sown at Matanuska on May 12. The crop was up May 25 and headed July 7 at a height of 28 inches. At maturity it reached a height of 36 inches. It was harvested September 1. This variety is bearded, having medium stiff straw and rather compact heads.

Early Baart is a bearded variety which came from California. Sown May 12, this wheat was up May 25 and headed by July 7, when it was 28 inches high. It finally reached a height of 42 inches, produced stiff straw, and stood up well. The grain was still in the milk stage on August 15, and it failed to mature properly.

Sunset, a smooth variety of wheat, is also from California. Sown May 12, this wheat was up May 25 and headed by July 7. On August 15 it was 32 inches high. This wheat did not ripen.

Ruby, a smooth variety of wheat which was obtained from the Central Experimental Farm, Ottawa, Canada, was sown May 12, up May 23, and headed by July 7 at a height of 30 inches. It produced rather thin straw and very small, short heads. Having ripened, it was harvested September 1. This variety will not be given further trial at the station because of the inferiority of its heads.

Prelude, a bearded variety which was also obtained from Canada, was sown May 12, up May 23, and headed July 7 at a height of 30 inches. The heads were rather short, but the straw was stiff and stood up well. This wheat ripened August 28 and was harvested September 1. It has the appearance of a promising variety.

Siberian No. 1, a bearded variety grown from station seed, has been used as a field crop for several years at Matanuska. At least 75 per cent of the crop always matures. The straw reached a height of 36 inches and when nearly mature showed a tendency to lodge. The heads were approximately 2 inches long and well filled. This wheat matured as early as did any of the other varieties and is well adapted to this locality. It was harvested September 1.

OATS.

Two small fields were sown to Canadian White oats on May 3 and 5, respectively. This ground grew the same variety last year. Germination in the first field was poor and the plants were very weak. The grain was ripe by September 1, but on account of the abundance of second growth it was not harvested until September 17. It was then placed in the silo. Germination in the second field likewise was so poor that the greater part of the ground had to be disked and reseeded. This crop was also placed in the silo.

On May 13 the variety Finnish Black was sown on 1 acre for seed production. The crop was up May 28 and ripe by August 25. It was harvested September 3, when the estimated yield was 50 bushels per acre.

To test their adaptability to conditions here the following varieties of spring oats were seeded in rows in small plats with a garden seed drill:

Leader, a variety of side oats obtained from Canada, was sown May 12, up May 24, and headed by July 7 at a height of 26 inches. The grain was in the early dough stage on August 15. Having ripened by September 1, this crop was harvested. It is a very promising variety.

Victory, a white variety obtained from Canada, was sown May 12, up May 24, and headed July 7 at a height of 24 inches. By August 15 it was 33 inches high and the grain was in the milk stage. About 5 per cent of the glumes were infertile and the straw showed a strong tendency to lodge. This oat was cut September 1, though not fully mature. It will not be given further trial at the station.

Gold Rain, another white variety obtained from Canada, was seeded May 12, up May 24, and headed July 7 at a height of 24 inches. At maturity it was 36 inches high and did not lodge. This variety was ripe by August 28 and harvested September 1. Although 5 per cent of the glumes were infertile, this oat appears to be a promising variety.

Sixty Day, the seed of which was obtained from the Rampart Station, was sown May 12, up May 27, and headed July 7 at a height

of 22 inches. It finally reached a height of 32 inches. Sixty Day produced very fine straw, which lodged to considerable extent. The heads were small and the crop was considered inferior from the standpoint of production. This variety was ripe by August 28 and harvested September 1. It will not be given further trial.

Ligowa No. 20459, seeded May 13, was up May 30 and reached a height of 48 inches by August 15. It stood up well, but was very late in maturing and did not mature sufficiently for seed purposes. It was not cut until September 14.

Kherson, produced from station-grown seed, was sown May 13, up May 28, and headed by July 11 at a height of 28 inches. It was ripe by August 28 and harvested September 1. The original seed was obtained from Minnesota three years ago and has been grown at the station since. This variety did much better this year than it did in any previous year at this station, and it gives promise of becoming a useful variety for Matanuska.

Burt Extra Early, grown from station seed, was sown May 13, up May 30, and headed by July 9 at a height of 22 inches. It finally reached a height of 36 inches. It germinated poorly and produced very light straw, which lodged to considerable extent. The heads were small and inferior. This variety will not be given further trial. The crop was ripe and harvested September 1.

Finnish Black, grown from station seed, was sown May 13, up May 30, and headed July 11 at a height of 26 inches. By August 15 it had reached a height of 48 inches and stood up fairly well. Being ripe August 28, the crop was cut September 1. This variety has been grown every year as a field crop for both grain and hay and has never failed to ripen when seeded early enough. Although its grain is lighter in weight than that of some of the white varieties and there is some objection to its color, it excels all others tried as an all-around crop.

The following hybrid oats, the seed of which was obtained from Fairbanks, were tried for the first time:

Hybrid No. 36-5, seeded May 16, was up May 28 and headed July 11 at a height of 22 inches. It developed smut to such an extent that it had to be cut before reaching maturity.

Hybrid No. 35e, seeded May 16, was up May 28 and headed July 11 at a height of 22 inches. By August 22 it had reached a height of 30 inches. Nearly 10 per cent of the glumes were sterile and the crop lodged to some extent. It was ripe and cut September 1.

Hybrid No. 25-9, seeded May 16, was up May 30, producing coarse straw and medium, well-filled heads. It stood up well. The crop was ripe and harvested September 4.

BARLEY.

Hull-less (S. P. I. No. 19851), sown May 4 on 2 acres that grew the same variety last year, was up May 21 and ripe August 25. It was harvested September 3, when its estimated yield was 10 bushels per acre. Its straw was rather short.

To test their adaptability to conditions here the following varieties of spring barleys were seeded with a garden seed drill in rows in small plats:

Hull-less (S. P. I. No. 19851), grown from station seed, was sown May 14, up May 27, and headed by July 11 at a height of 28 inches.

This beardless and hull-less variety is grown every year as a field crop, ripens early, and produces well. The grain is hard, however, and should be ground or crushed for stock feeding. Hull-less No. 19851, when grown in comparison with other varieties, developed smut to such an extent that it had to be cut before reaching maturity.

Bark barley, a 6-rowed, bearded variety from the Central Experimental Farms, Ottawa, Canada, was sown May 13, up May 24, and headed July 11 at a height of 24 inches. It grew to a height of 32 inches when ripe and showed some tendency to lodge. This barley produced medium-sized, compact heads with extremely long, coarse beards. The crop was ripe August 25 and harvested September 1.

Albert barley, a 6-rowed, bearded variety also from Canada, was sown May 13, up May 25, and headed by June 25 at a height of 24 inches. It was ripe August 20 and harvested September 1. This variety has short, stiff straw and very long, coarse beards. The heads are short and small. Its earliness is its only merit.

The following hybrid barleys, the seed of which was obtained from the Fairbanks Station, were tried for the first time:

Hybrid No. 14a, a beardless and 2-rowed variety, was seeded May 14, up May 30, and harvested September 1, although it had not fully matured. This barley had some tendency to lodge and produced straw that reached a height of 36 inches.

Hybrid No. 14b, a 6-rowed, bearded variety, was seeded May 14, up May 27, and harvested September 1. It had reached a height of 33 inches by August 22 and lodged to considerable extent. This barley produced fairly compact and well-filled heads having long, coarse beards.

Hybrid No. 28a, a 6-rowed, beardless, black variety, was seeded May 14, up May 24, and headed July 11 at a height of 24 inches. On August 22 it was 32 inches high and standing up well. The heads were medium long and well filled. This promising variety was cut September 1.

Hybrid No. 19b, a 6-rowed, hull-less, beardless variety, was seeded May 14, up May 26, and headed July 11 at a height of 24 inches. It was 33 inches high at maturity and produced very large, fairly compact, well-filled heads. This, one of the best of the hybrid barleys, was harvested September 1.

LEGUMES.

Alfalfa.—Nearly all of the Grimm alfalfa plants in the plat seeded in 1919 are still living. During the past season they produced a good growth of forage and set innumerable seed pods, some of which ripened. It is too soon to state definitely whether alfalfa growing can be made a success at this station.

Clover.—About one-sixteenth acre of alsike clover was seeded May 12 on ground that had been given a light dressing of stable manure and had been fall plowed. Germination was retarded by dry weather, and the best plants produced stalks 2 feet long, but bore foliage that was of a very light-green color, indicative of the lack of some essential for normal development.

Hubam clover, a white-flowered annual sweet variety, was planted June 5, the seed having been obtained from the experiment station in Iowa. Some of the plants were up by June 25 and the remainder



FIG. 1.—SUPERINTENDENT'S COTTAGE, MATANUSKA, 1921. GRAIN PLATS IN FOREGROUND.



FIG. 2.—GATHERING RASPBERRIES, MATANUSKA STATION, 1921.



FIG. 1.—THRASHING, MATANUSKA STATION, 1921.

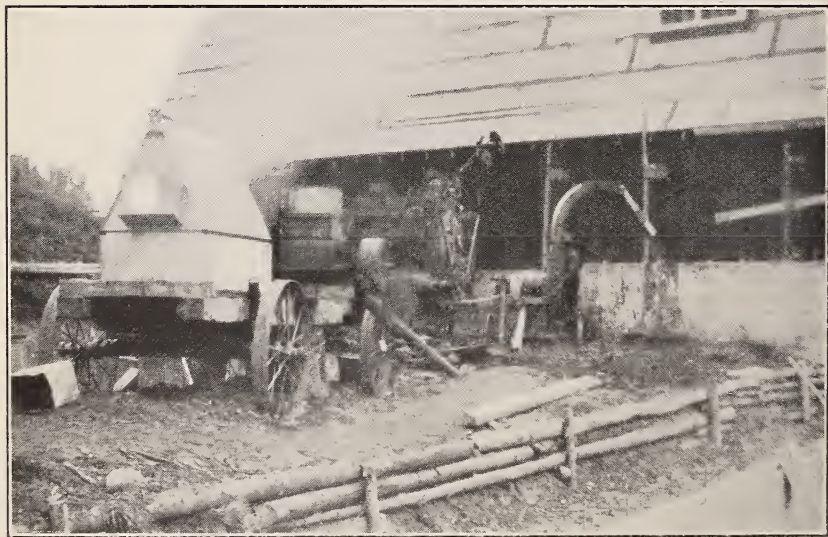


FIG. 2.—FILLING SILO MATANUSKA STATION 1921.

were brought up by early July rains. This variety began to blossom September 1, but set no seed. It grew to an average height of 36 inches. Hubam clover, which produces a large amount of forage in some of the States, is deemed worthy of further trial at this station and a larger planting will be made next year.

Grasses.—None of the cultivated grasses has so far given entire satisfaction either for pasture or for hay making. A mixture of the more common varieties was seeded on 14 acres, however, with the expectation of using them for pasture.

ROOT CROPS.

Potatoes.—During the period between May 18 and May 21 a total of nearly 2 acres was planted with White Bliss, Burpee's Superior, Irish Cobbler, Green Mountain, Early John, and Rural New Yorker. Of a lot of 40 named varieties that had been given a two years' trial at the station, these were selected as being the best. No comparative test for quality has as yet been made, but the quality of potato crop of the Matanuska Valley, as a whole, has never been finer than that of this year. The average yield from the above-named varieties is estimated at 8.5 tons, or 283 bushels, per acre.

Thirteen other named varieties that were considered worthy of trial were planted in short rows during the season. At the end of this, the fourth season, the varieties that are not adapted to the region will be eliminated.

A few hills each of 40 seedling varieties were planted May 21. Some of them have been grown for four seasons, some for two seasons, and some for one season. Notes have been taken on their habits of growth and a test of quality will be made during the coming year.

Mangels.—Yellow Globe and Improved Golden Tankard varieties were seeded May 25 on a plat that had been plowed and fertilized with stable manure. These two were selected as the best of some five or six varieties that had been tried for several seasons. They made a fine crop, the former yielding at the rate of nearly 20 tons per acre, the latter at the rate of 15.25 tons per acre.

Rutabagas.—On June 29 one-fourth acre was seeded to rutabagas, which yielded at the rate of 10 tons per acre.

Beets.—Sugar beets were planted May 24 on a small plat and grew about as well as they did in former years, but developed the usual side rootlets. The best roots weighed from 1 to 1½ pounds each. The estimated yield per acre was 6 tons.

Carrots.—The Mastodon carrot, used for stock feed, was seeded May 24. Germination was considerably retarded by dry weather and the crop was not as good as it has been in other years.

VEGETABLES.

Peas.—Alaska, Stratagem, Thomas Laxton, Premium Gem, and Horsford's Market Garden were planted between May 7 and May 10. Some of the Alaska variety was ready for use by July 20. All bore abundantly, the crop coming on in the order of the varieties named.

Beans.—Stringless Green Pod and Long Yellow Six Weeks were planted May 24 on ground that was nearly level and on ground having a south slope. The seed germinated soonest and produced

the best crop in the latter place. The crop was better this year than it was in either of the two previous years, and many of the pods were from 6 to 8 inches long. Some pods became too mature for table use, but none ripened seed. Of the two varieties grown, the Stringless Green Pod seems the better in quality.

Beets.—Detroit Dark Red made the best crop ever grown at the station.

Carrots.—Oxheart, which seems to be the variety best adapted to this locality, was seeded May 10 and produced a splendid crop, with carrots large enough for use by August 1.

Cabbage and cauliflower.—Plants, grown in the hotbed, were transplanted late in May. As a result of root-maggot attack, however, only a small number of the cabbage plants and none of the cauliflower matured. This is the first time that root maggots have been noticed at the station.

THE NURSERY.

Red raspberries.—During the fall of 1920 the canes were bent to the ground and covered with spruce boughs and straw as a winter protection. They were uncovered the following spring as soon as the snow had disappeared and danger of severe frost was past. None of the protected canes froze back this year. From the standpoint of fruit production, the covering was a marked success, all of the covered rows producing abundantly. (Pl. V, Fig. 2.) The canes in the uncovered rows, which were left to serve as a check, froze back severely during the winter and bore only a small quantity of fruit. These results were in accord with those obtained in former years.

Strawberries.—Another start in the strawberry bed had to be made because of the freezing out of all plants during the winter of 1919-20. A few plants that were set out late that summer came through the succeeding winter in fair condition, but they produced very few berries. Several hundred plants were set out in July of this year, and it is hoped that good results will be obtained from them.

Currants.—During the past season the native wild currants in the valley produced prolifically and the fruit was of very large size. The cultivated varieties are expected to do well in this locality, where a large amount of native fruit grows. All of the varieties grown at the station, with the exception of Black Champion, a black variety which froze back considerably during the previous winter, produced very well and are hardy.

Gooseberries.—The gooseberries again froze back. Of the varieties grown, Columbus and Champion, the latter appeared the hardier of the two and produced considerable fruit of good quality. Gooseberries should be given some winter protection.

Shrubs.—A few plants each of the following varieties, obtained from the Sitka Station during early summer, grew well at the station: Cinquefoil, *Spirea vanhouttei*, and Siberian dogwood (*Cornus sibirica*). Tartarian honeysuckle (*Lonicera tatarica*), and Japanese roses (*Rosa rugosa*) were as hardy as in other years.

LIVESTOCK.

As the country continues to develop, live-stock raising will become more of a leading agricultural industry than it is at present. Suffi-

cient land to supply the necessary winter's feed must be cleared before it can be developed to any extent, however. During the year new lands were steadily brought under cultivation and the number of live stock, especially of hogs and cattle, was materially increased both by birth and by importation. Only hardy stock should be introduced into Alaska, where the winters are long and where cattle and other stock must be sheltered for at least six months of the year.

Cattle.—The Milking Shorthorns that were brought to the station over a year ago have done well. One of the two heifers, freshening for the first time on February 26, yielded 5,268.6 pounds of milk during her first nine months. In addition to giving a fair yield of milk, all of the cattle came through the winter in fine condition. They were fed, for the most part, oats and barley hay, supplemented with root crops and a small amount of concentrated feed. Toward spring a small quantity of alfalfa was added to the ration to replace the home-grown hay, the supply of which was short.

Two heifers and two bull calves were dropped during the past spring and summer. One of the latter was sold when about 3 months old for future breeding stock. The heifers will be retained at the station until a herd of sufficient size has been developed. During November of this year five Galloway heifers and one bull were received from the Kodiak Station.

Sheep.—During the winter the sheep were maintained on a ration of oat and barley straw, supplemented with a mixture of unground wheat and oats. During the early part of the winter very little of the concentrates was fed, but with the advance of the lambing season 2 pounds were fed daily per head, together with a small quantity of roots, consisting mainly of potatoes. During the summer the animals were pastured where they had access to the native bluetop and fireweed. They were left in the pasture until about November 1, and seemed to relish the fireweed as much as they did the bluetop.

Many farmers are becoming passively interested in sheep raising, and some of them will doubtless become actively engaged in it before long. Sheep can be raised with a minimum of care and trouble. They do not need a great deal of shelter and are able to pasture for themselves during approximately seven months of the year.

REPORT OF WORK AT FAIRBANKS STATION.

By G. W. GASSER, *Assistant in Charge.*

WEATHER CONDITIONS.

Measured by an 11-year (1911-1921) average, the year 1921 was above normal in precipitation and below normal in the number of frost-free days. The snowfall was 65.65 inches, which is 25.61 inches above normal. During March, when the fall totaled 33.10 inches, there were severe windstorms that caused heavy drifts in exposed places. The snow remained on the south-slope fields until May 7, notwithstanding the fact that there were 20 clear days in April and no precipitation. The summer precipitation was well

distributed and totaled 5.12 inches, which is fairly normal. The total precipitation for the year was 13.39 inches, which is about 1.52 inches above normal. The 1.51 inches of rain during the first 11 days of October and the 1.19 inches in September left the soil supplied with sufficient moisture to be carried over the winter for the spring crops.

The last spring frost came May 30 and the first fall frost September 2. This gave a frost-free period of 95 days, which is 7.3 days less than the 11-year average. During the year 1921 there were 146 clear days. Of this number only 51 came within the summer period, beginning with May and ending with September. The remaining 219 days were either cloudy or partly cloudy.

The minimum temperature of the year, -56° F., occurred January 3, and the mean temperature for that month was -17.1° F. The maximum temperature of the year, 87° F., occurred August 6, and the mean temperature for that month was 58.21° F. The year was not marked by any extremes of temperature, and the summer rains were adequate and timely, all of which was favorable for crop production.

GENERAL CROP WORK.

Seeding was not begun as early as usual on account of the late, heavy fall of snow and the cold weather of April and the first of May.

A total of 40 acres cropped for hay yielded about 30 tons. Seeded late, the greater part of this hay could not be cut in time to cure before hard freezing weather came.

Several acres were planted with peas for seed production and for use as a green manure. As a result of seeding late and the heavy growth of volunteer oats, wheat, and barley, the entire area in peas was cut with a mower and the crop made into excellent hay. Timely rains brought up a short second growth of peas and grain which was turned under. Early fall plowing is of advantage in that it exposes volunteer seeds to the surface air and moisture, causing them to germinate and be destroyed by frost.

During July and August manure obtained from an abandoned grading camp of last year was hauled to the south slope and spread over 10 acres.

GRAIN CROPS.

The seeding of small plats was begun May 27 and finished June 2. All plats were on south-slope land, most of which had been fall-plowed. Plats Nos. 1 to 28, inclusive, were seeded with a 2-horse drill, each plat having 1 drill width 15.4 rods long and a 2-foot alley. This test was undertaken to compare grain yields, but the purpose was defeated by the late, uneven ripening of the crop.

OATS.

Plat No. 1, Seed from South Dakota.—Seeded May 30, this oat was harvested August 22 at a height of 36 inches. The heads were well filled, containing from 40 to 60 kernels. About 5 per cent of the crop lodged.

Plat No. 2, Sixty Day.—This strain, considering its dwarfness, is rather late, requiring 90 days to ripen. The straw was only 24 inches long, and the heads were correspondingly short and contained from 18 to 30 kernels. *Sixty Day* is not a desirable or attractive sort.

Plat No. 3, hybrid No. 25-9.—Ripening also in 90 days, this oat was 14 inches taller and produced larger heads than *Sixty Day*. Its straw was stiff and the kernels were medium plump. Although apparently stable, this hybrid was considerably mixed with other oats.

Plats Nos. 4, 6, 56, 107, and 109, Canadian.—These plats were seeded May 29 and 30 and June 1. Plats Nos. 4 and 6 were single-drill width, and their crops were not fully ripe when harvested September 6. Failure to ripen was doubtless due to the location of the plats and to the wide alleyways. The other three plats were on somewhat drier land, and the smallest of the three, 16.5 by 21 feet, made an exceptionally strong growth and yielded at the rate of 47 bushels per acre. The straw was long and large; and the heads were well filled, containing from 75 to 100 kernels. Plats Nos. 107 and 109 were long and narrow, comprising 0.625 and 0.25 acre, respectively. The smaller of these was considerably the better, making a stronger growth and yielding 5 bushels more per acre than the larger one. The crop was harvested August 23. The larger and poorer plat was not ripe until September 1 and was considerably mixed with volunteer buckwheat and black oats. This plat yielded at the rate of 30 bushels of oats per acre. Canadian oats, introduced from California several years ago by J. W. Neal, is an excellent variety and well adapted to conditions here.

Plat No. 7, Banner.—This variety is too late to be of value here. Only 75 per cent of the crop was ripe by September 6. In exceptional years only and on the most favorable locations has this variety thoroughly ripened either here or at the Rampart Station.

Plat No. 8, New Swedish.—This is another late oat that failed to thoroughly ripen. The heads were of medium length and paniced, and the white kernels were not very plump. The beard was black at the base. New Swedish was quite inferior to the variety grown in plat No. 9.

Plat No. 9, Swedish Select.—This is a much stronger-growing sort than the New Swedish, but it also failed to ripen fully. The heads were large and contained from 75 to 100 medium-plump kernels which were creamy white in color.

Plat No. 10, Climax.—This variety was only 50 per cent ripe when it was harvested, September 6. It grew to a height of 40 inches and bore medium-sized, paniced heads. The kernels were white, medium plump, and awned.

Plat No. 11, Scott and Magner.—This plat made a very even growth of oats 40 inches high. The heads produced were small, but of a rather handsome purple cast. The crop failing to ripen fully is of no value here.

Plat No. 12 (No. 304).—This hull-less variety is also grown at Rampart. It is white, paniced, multiflorous, of medium vigor, and produces straw of good length. Being a late-maturing variety, it can not be depended on at this station. About 10 per cent of the crop ripened this year.

Plat No. 13, Hansen (G. I. No. 240).—As in previous trials, this variety produced a heavy growth of straw and large, open heads.

The kernels were large but the hulls are large in comparison with the size of the grains. When cut September 6 this oat was 90 per cent ripe.

Plat No. 14, hybrid No. 25a-3.—Seeded May 30, this hybrid was harvested August 24, requiring only 85 days to ripen. It reached a height of 40 inches, and produced fair-sized heads which contained from 40 to 70 kernels having a purple bloom. The grain is too light and the straw too weak to be a valuable sort.

Plat No. 108, Eclipse.—This variety, seeded May 29 on 0.44 acre, was cut with the binder on September 1. It was a "side" oat having fairly plump, white kernels. The straw was of good length and strength, and the yield, at the rate of 34.5 bushels per acre, was satisfactory.

BARLEY.

Plat No. 16, Boehme No. 130-13 (S. P. I. No. 19851).—Although grown for a number of years at the stations of the interior, this barley has not shown itself adapted to this climate. The straw was very weak and short, and the grain, which is hull-less, discolored considerably. A large part of the crop lodged this year.

Plats Nos. 17, 20, 24, and 36.—These plats were seeded with barleys Nos. 19-3, 14a, and with Gold, respectively, but produced a poor stand and had to be reseeded. The crop was cut for hay.

Plat No. 18, hybrid 14b.—This plat made a fine appearance, standing 50 inches high and producing heads that were large and well filled. Due to the rich soil and the inherent tendency of the crop to lodge, this hybrid lay flat a short time before the grain ripened. It was cut with a scythe on September 5.

Plats Nos. 19 and 32, hybrid 28-2.—This 6-rowed, black, hull-less and hooded barley has many desirable qualities. Plat No. 19, consisting of 0.035 acre, yielded at the rate of 40.8 bushels per acre, and produced rather rank straw, 10 per cent of which lodged. The heads were medium to large, and contained from 50 to 60 kernels. The grain was ripe and harvested September 5. The ground of plat No. 32, which was 0.302 acre in size, was much poorer than that of plat No. 19, and produced short straw, none of which lodged. The heads were smaller than those borne by plat No. 19, but they were well filled. This plat was harvested August 24 and yielded at the rate of 29.3 bushels per acre. Being a hull-less variety, this barley was allowed 60 pounds to the bushel.

Plats Nos. 21 and 35, hybrid No. 21-4.—Like its Abyssinian forbear, this hybrid is a short-strawed, sturdy type that is well adapted to rich ground and exposed situations. The heads were 2-rowed, black, and hooded. Unfortunately, they have a brittle rachis, which caused the heads to break off easily, either wholly or in part, when they were being dried. Doubtless this accounts in some measure for the low yield of 10.4 bushels per acre of plat No. 21 and 17.9 bushels per acre of plat No. 35. The crops were ripe and harvested August 24 and 17, respectively.

Plat No. 22, Chittyna.—This barley produces weak straw and heads that curl on drying and then break in half. August 29 it had to be cut with a scythe, as 98 per cent of the crop lodged flat. The heads were large and contained as many as 66 kernels.

Plat No. 37, hybrid No. 4a-1.—This hybrid was harvested August 29, when 90 per cent of the crop was ripe. It is a medium-growing sort of doubtful value.

Plat No. 23, Beardless (S. P. I. No. 19852).—This beardless, 6-rowed barley would be of merit were it not for its straw, which is not stiff enough to be satisfactory. The heads ranged from 2.75 to 3.75 inches in length and were well filled. They did not ripen early and many of the tillers were green when the crop was harvested September 1.

Plat No. 25, Wisconsin Pedigree.—This variety also produces weak straw. The whole crop lodged before ripening September 2. The heads were uneven in size, ranging from 3 to 5 inches in length and containing as many as 80 kernels.

Plat No. 26, Manshury.—This standard sort continues to do well and were it not for its beardedness would be very satisfactory for general culture here. It produced rather short straw and average-sized heads. Its yield was very high, being 72 pounds, or at the rate of 42.8 bushels, per acre.

Plat No. 27, Lapland.—A full stand was not produced by this plat and the yield, at the rate of 26.8 bushels per acre, is not therefore an indication of its productiveness. Lapland is a bearded variety and is on a par with Manshury in desirable characteristics.

Plat No. 28, Pamir No. 124 (S. P. I. No. 18922).—This variety, which produces straw from 20 to 26 inches long, matures early, ripening on August 13 this year. The heads were small and bearded, but the yield was fair, being at the rate of 17.8 bushels per acre.

Plat No. 30, hybrid No. 19-3.—In point of excellence, this barley easily leads all varieties tried at the station. (Pl. VII, Fig. 1.) Seeded on 0.284 acre May 27, it was harvested August 15, requiring 80 days to ripen. The grain yield was at the rate of 43.2 bushels per acre. Being a hull-less type, this barley was allowed 60 pounds to the bushel. This is a dark strain of No. 19-3, which breeds true to type.

Plat No. 31, hybrid No. 19-3.—This plat adjoined the preceding one and consisted of 0.333 acre. Both plats were very favorably located on south-slope land that had received a dressing of stable manure the previous year. Plat No. 31 produced at the rate of 40.9 bushels per acre. About 5 per cent of the heads were of the white, recessive type. The white strain has slightly smaller heads than the dark strain, but according to tests made at the Rampart Station the past two years it has the better germinating qualities of the two barleys. For some unaccountable reason, plat No. 31 ripened seven days later than plat No. 30.

Plat No. 33, hybrid No. 14b.—Seeded May 29 and ripe September 2, this bearded and hull-less barley made a fine appearance. A number of the heads were 5 inches long and contained 70 kernels. The straw is a trifle weak and a small percentage of it lodged. The 0.185 acre yielded at the rate of 31.2 bushels per acre.

Plat No. 34, hybrid No. 20-1.—This 6-rowed, hooded and hull-less barley did not come up to expectation in point of earliness, requiring 91 days to ripen. Other selections of hybrid No. 20-1 series have rivaled Pamir in this respect. The plat contained 0.063 acre and yielded at the rate of 23.4 bushels per acre.

Plats Nos. 48, 49, and 50, Dönnes, Mjös, and Moskin.—These are Norwegian importations and were grown at the station for the second time. All are early, ripening in 86 days, but have weak straw and bearded heads. They are not of sufficient value to warrant further trial.

SPRING WHEAT.

Plats Nos. 57, 58, and 59, wheat No. 30a-6.—These were small plats totaling 0.018 acre and the wheat produced on them was identical throughout. It reached a height of 40 inches and bore well-filled heads from 2 to 3.5 inches long having short terminal beards. It made very uniform growth and had a most excellent appearance. Seeded June 1, the crops on these plats were harvested September 2.

Plats Nos. 29 and 110, Siberian No. 1 (Chogot).—Seeded May 28 on 0.25-acre plat No. 29, the crop was harvested August 22. Its straw was rather short, but the heads were normal and the yield, at the rate of 18 bushels per acre, was fairly satisfactory. Plat No. 110, which contained 1.12 acres, was seeded May 29, and the crop was ripe August 23. Grown on richer soil than the wheat of plat No. 29, this crop made a better appearance and yielded 2.7 bushels more per acre than did the other. Siberian No. 1 (Chogot) produced 3,000 bushels of wheat in the interior last summer and the flour from it made excellent bread. Unfortunately, it has become confused in the Tanana Valley with another Russian wheat known as H. G. Siberian No. 1 (Chogot). It has dark-colored chaff, while H. G. has light-colored chaff.

Plat No. 111, Romanow.—Grown on 0.66 acre, this variety yielded at the rate of 24.9 bushels per acre and produced straw that reached a height of 39 inches and uniform heads that were 2.25 in length. Seeded May 29, this crop was harvested September 1, nine days later than Siberian No. 1 (Chogot). Romanow is a fair wheat and is almost sure to ripen on south-slope land. In yield of grain and weight of straw it is superior to Chogot, but since the latter is the earlier of the two it is the one to be relied upon for the main crop.

POTATOES.

The potato crop of the station was grown on south-slope land. Planting was begun June 2 and finished June 3. A one-row planter having fertilizer attachment was used, and two fields, 3.6 and 0.25 acres, were planted. In the larger field a fertilizer test was made with nine varieties of potatoes, a complete fertilizer being applied at the rate of 400 pounds per acre on two rows of each variety. The increase per row for the several varieties varied from 35 pounds with Carman to 143.4 with Vornehm. The average gain per row was 81.8 pounds.

At digging time the market value of the potatoes was 5 cents per pound. The cost of the fertilizers was 7 cents per pound, or \$1.40 per 20 pounds to the row. Profits obtained from the fertilized ground were at the rate of \$2.69 per row, or \$53.80 per acre, each row equaling 0.05 acre. Had a heavier application been used the profits would doubtless have been higher than they were. The following table gives the result in yield of fertilizer tests with nine varieties.

Result of fertilizer tests with potatoes.

Variety.	Length of row.	Fertilized area.		Unfertilized area.		Increase per row.
		Number of rows.	Yield per row.	Number of rows.	Yield per row.	
	<i>Feet.</i>		<i>Pounds.</i>		<i>Pounds.</i>	<i>Pounds.</i>
Gold Coin.....	640	2	239	6	165.8	73.2
Early Ohio.....	640	2	208.5	6	167.3	41.2
Extra Early Pioneer.....	640	2	322.2	6	213	109.2
Beauty of Hebron.....	640	2	301.5	6	256.5	45
Eureka.....	640	2	341	6	221.8	119.7
Burpee's Superior.....	640	2	292.5	6	221.6	70.9
Vornehm.....	640	2	407.5	6	265.8	143.7
Ohio, Jr.....	640	2	346	6	247	99
Carman.....	640	2	315	6	280	35

On the 0.25-acre field, planted with the variety Early Market, fertilizer was applied at the rate of 400 pounds per acre. The vines produced were spindling and the yield was poor, netting 762 pounds, or about 50.8 bushels, per acre. The potatoes were severely affected with scab, which undoubtedly had a large part in reducing the yield. This land is in need of humus, as are most of the south-slope fields. Although the potato crop for 1921 was not heavy either here or elsewhere in the farming section of Fairbanks, it was of better quality than average.

ROOT CROPS.

Turnips.—The Petrowski was the only variety of turnip grown at the station this year. It produced a fair crop and roots which weighed from 1 to 6 pounds. Had the stand been thinned, the size and weight of the crop would doubtless have been greater than they were. Medium-sized roots are best for storing, however, and are easy to put through the vegetable slicer.

Rutabagas.—A purple-top variety of rutabaga was grown during the year and produced a splendid crop. The roots were medium to large, firm, and sweet. In keeping quality they are much superior to turnips, as they do not rot as easily as do the latter, or become pithy. The only drawback to the rutabaga for use as a stock feed is in the branching and fibrous nature of the lower part of its root. Dirt clings tenaciously to these rootlets, especially if they are dug when wet.

Beets.—Sugar-beet varieties Dippe, Kleinwanzleben, and two unnamed sorts marked "Idaho-grown" and "1920," all from the United States Department of Agriculture, were grown in trial rows on good south-slope soil. The tops made thrifty growth and the roots attained fair size. Like the rutabaga, the beets had fibrous rootlets which were not easily cleaned for use as a stock feed. On account of its high sugar content, however, the beet is especially valuable for feed.

THE GARDEN.

Cabbages, carrots, cauliflowers, parsnips, beans, and peas were grown in the garden. Of the 200 cabbage plants set out, fully 15 per cent died. Some of those that lived had fair-sized, firm heads,

and others failed to head, having started too late. The carrot and parsnip seed germinated poorly, and those that grew produced medium-sized roots. Only a few cauliflower plants were set out and these produced small heads. The beans were of the climbing sort and grew vigorously. Coming up late, however, they scarcely bloomed before being killed by frost.

Of the peas, Koldee, Alaska, and McDonald, a local variety, did equally well, producing abundantly. Rotation plats Nos. 1, 2, 5, 7, and 8, each 0.25 acre, were seeded May 27 with McDonald. A good stand was obtained and the vine growth was fairly vigorous. Since, in the general scheme of rotation, the peas are grown for green-manure purposes, it was intended that they should attain maximum growth before being plowed under. This plan could not be carried out in its entirety because of the growth of volunteer grain, which made nearly a 50 per cent stand. Had the peas been allowed to reach maturity, the grain would have ripened and shattered and fouled the land for next year's crop. The plats, therefore, were mowed for hay the early part of August, and a few weeks later, after a second growth of peas and grain had made a good start, the plats were plowed. On a large field of several acres, also seeded with peas, the same procedure was followed except that the land was manured before it was plowed. The Rampart Station, having a surplus of Alaska pea seed, sent about 200 pounds to Fairbanks for use in the early spring planting.

ALFALFA.

No alfalfa has been seeded since the spring of 1918. From observations of the various plats the varieties North Swedish, Grimm, and Hansen's Semipalatinsk are less likely to be winter injured here than they are at Rampart. Their growth, however, is not rank enough to warrant any of them being grown solely for hay. Oats and barley make better tonnage than does alfalfa. This year was favorable for general crops, but it was unfavorable for alfalfa-seed production, and the amount of seed that did ripen was very small. Some of the varieties bore no seed. *Medicago falcata* led the varieties and was closely followed by Grimm. All the alfalfa plats are long and narrow and the varieties grow in contiguity, with the result that some of them have intermingled.

BUCKWHEAT.

The acre field grown in 1920 produced a full stand of volunteer buckwheat which formed considerable seed by August 2, when the crop was mowed for hay to clean the ground for next year's crop. The hay was much relished by horses and cattle, and was preferred by them to either oat, barley, or pea hay.

SMALL FRUITS.

Strawberries.—The strawberry bed on the south-slope land made a fine appearance. The vines made thrifty growth and runned freely, setting many new plants. They blossomed sparingly and set only little fruit, however. For some unknown reason these hybrids have never done as well at this station as they have at Rampart.

Raspberries.—The native raspberries made thrifty growth and bore freely, but a great deal of the fruit being wormy was unfit for table use. The exotic raspberries wintered with the usual result, the canes freezing back considerably and setting only little fruit. This fall, in a small section of the plat, the canes were laid down by cutting the roots on one side with a spade, tipping them over, and placing a spadeful of earth on the clump to hold it down. This treatment was given to see if it would prevent the canes from freezing. One farmer reported a good crop of cultivated raspberries which sold readily on the local market at 50 cents per box.

COOPERATIVE WORK.

In cooperation with the Office of Tobacco and Plant Nutrition Investigations of the Bureau of Plant Industry, United States Department of Agriculture, soy beans and tobacco were grown to determine the possible effect of prolonged daylight on the growth and flowering of the plants.

Mandarin and Pekin varieties of soy beans were planted in the field June 1 and produced a 90 per cent stand. The growth throughout the summer was slow, and by the end of the summer the tallest plants of each were 19 inches. The leaves of the Mandarin plants were severely rusted, and neither variety set buds or blooms.

Connecticut Broad Leaf and Maryland Narrow Leaf varieties of tobacco were sown in flats May 17, and early in July the plants were set in the garden. They grew equally well and were fairly thrifty, and the tallest plants attained a height of 31 inches. (Pl. VII, Fig. 2.) Several of the plants budded but none blossomed. Plants that were left in the flats grew well, but they did not bloom. All were cut on September 3 and hung up to cure. These varieties will be tried again next spring, when the plants will be given an earlier start than they had this year.

FLOWERS.

Of the several varieties of flowers that the retiring superintendent had planted to beautify the surroundings, the dwarf nasturtium made the finest growth. The sweet peas produced many brilliant blossoms and the snapdragons sent up splendid spikes of flowers of various shades. The canary-bird vines covered the trellises and other support with a mass of green and yellow. In one part of the house yard the Iceland poppies made a bright showing for several weeks. They are perennial here. Cosmos and aster plants were vigorous, but were cut down by the frost before blooming. The experimental work with flowers, as carried on at the Rampart Station, will be continued here.

LIVESTOCK.

The station now has on hand 3 mares, 2 of which are 12 years old and the third of which is 7 years old; 2 yak, a bull and a cow; 1 Toggenburg buck, 1 grade doe, and 2 young grade bucks; 1 registered American Hampshire boar, and 2 registered American Hampshire brood sows; and 1 registered Shorthorn bull and 1 registered Shorthorn cow, the latter of which has dropped a bull calf, and a heifer.

Since July 1, 1921, the station has sold to near-by farmers 24 pigs, 1 brood sow of the Duroc-Jersey breed, and 1 young Toggenburg buck; and has bred 10 cows to the Shorthorn bull, 12 sows to the Hampshire boar, and 2 goats to the Toggenburg buck.

Station cattle and other cows near Fairbanks were tested for tuberculosis and passed by Doctor Truby, a veterinarian connected with the Territorial government. Nearly all the cows are owned by four dairies which are located near Fairbanks. Here and there a farmer owns a cow or two, and doubtless others will purchase now that clean, purebred stock can be had from the station.

Hog raising is general among the farmers and shows a healthy increase. The station has greatly aided in building up this industry by loaning the station boar free of charge to those having sows. Since December 1 this boar has produced 146 offspring, 140 of which were belted like the sire.

There are about 50 goats in this section, most of which are graded stock that was shipped in last summer. Several of the farmers own purebred Toggenburg does and one or two purebred Toggenburg bucks. Those having good does seem pleased with the quality and quantity of the milk they produce. Goats should be more economical than cows on farms that are as widely separated as those here. One farmer can not afford to keep a bull, but he can keep a buck at comparatively little cost. Only purebred goats should be kept, and they should be given good care.

TANANA VALLEY CROP PRODUCTION.

During 1921 there was a total of 1,820 acres under cultivation in the Tanana Valley, of which 141 acres were new clearings and 180 acres were summer-fallowed land. The following data, compiled by the Tanana Valley Agricultural Association (Inc.), give ample proof that farming is now a profitable occupation for many in the valley:

Crop production in the Tanana Valley.

Product.	Quantity.		Area on which produced.
	Tons.	Bushels.	Acres.
Vegetables.....	500	.....	100
Potatoes.....	392	.....	152
Oat hay.....	1,006	.....	1,036
Oats and barley.....	.....	1,270	28
Wheat, mostly Siberian No. 1 (Chogot).....	.....	3,516	183

Under the management of the same association boys' and girls' pig and chicken clubs were organized, and prizes totaling \$300 were offered to children doing the best work in the clubs and also to those growing the best garden.

A small flour mill, located in Fairbanks and under the management of the Tanana Valley Association (Inc.), began operations in December, producing three grades of flour—white, whole wheat, and Graham. This mill has a daily capacity of 25 barrels.

REPORT OF WORK AT RAMPART STATION.

By C. S. HAHN, *Assistant in Charge.*

WEATHER CONDITIONS.

The winter of 1920-21 was about average, as is shown by the following table which compares the meteorological data of 1920-21 with the average for the past 16 years:

Comparison of meteorological data of 1920-21 with the averages of the past 16 years.¹

Month.	Mean maxi- mum.	Mean mini- mum.	Daily mean.	Total pre- cipita- tion.	Number of days.				Total snow- fall.
					Clear.	Partly cloudy.	Cloudy.	Rain or snow.	
	° F.	° F.	° F.	In.					In.
January (1921).....	-13.8	-36.7	-27.8	0.40	15	4	12	5	7.9
January (16-year period).....	-11.6	-27.6	-19.6	.53	13	5	13	6	6.4
February (1921).....	5.2	-21.8	-13.5	.23	11	2	15	3	2.6
February (16-year period).....	2.5	-15.4	-6.4	.68	10	5	13	6	7.8
March (1921).....	15.9	-7.2	4.4	1.42	6	7	18	9	19.1
March (16-year period).....	18.2	-7.6	5.3	.59	13	6	12	4	6.3
April (1921).....	33.9	7.4	20.6	.01	15	9	6	1	.0
April (16-year period).....	38.6	9.1	23.9	.25	15	8	7	1	2.6
May (1921).....	53.5	31.8	42.6	.17	13	8	10	4	.0
May (16-year period).....	58.2	31.9	45.0	.50	12	9	10	4	.2
June (1921).....	69.9	45.4	57.6	1.08	7	10	13	12	.0
June (16-year period).....	73.5	43.1	58.3	.97	10	10	10	8	.0
July (1921).....	74.8	48.4	61.6	.96	13	11	7	12	.0
July (16-year period).....	75.3	47.4	61.4	1.23	7	9	15	11	.0
August (1921).....	69.2	46.4	57.8	2.55	12	6	13	13	.0
August (16-year period).....	69.0	39.3	54.2	1.55	6	9	16	10	.0
September (1921).....	45.9	27.0	36.4	.53	13	2	15	7	.0
September (16-year period).....	52.0	30.7	41.4	1.25	6	6	18	8	.6
October (1920).....	26.0	16.8	21.4	1.21	1	3	27	8	12.7
October (16-year period).....	27.6	13.4	20.5	.93	6	5	20	7	7.0
November (1920).....	4.0	-5.5	.7	.04	16	5	9	1	.4
November (16-year period).....	4.3	-9.2	-2.6	.54	8	15	17	6	6.8
December (1920).....	8.1	-5.5	1.3	1.15	9	8	14	8	12.0
December (16-year period).....	-6.3	19.9	-12.1	.72	9	15	17	6	7.6

¹ In this table the year begins Oct. 1 instead of Jan. 1. Precipitation falling from this time is to a large extent held in the soil by freezing and is effective as moisture for the crops of the following year. The lightest precipitation for the 16-year period was 7.52 inches, in 1915, and the heaviest 14.97 inches, in 1907.

The 16-year average date of last killing frost is May 22 and of first killing frost August 30. In 1921 the last killing frost was May 21 and the first September 2, giving a frost-free period of 99 days. The first date is of minor importance, because the crops may not be up. Many seeds are planted before the spring frosts are over and are not in the least injured by them.

October, 1920, was colder, with a greater fall of snow than the 16-year averages for the same month. This was amply compensated for, however, by the warm temperatures and light snowfalls of November and December. January and February were decidedly colder than the 16-year averages for those months and had light snowfall. March was warm and its heavy snowfall brought the total almost up to that of the average. The other months were colder than the 16-year averages, with the exception of August, which had a daily mean several degrees warmer and a maximum mean that was cooler than the average August of the 16-year period. During June,

August, and March the precipitation was heavier than that of the 16-year period average, and for all the other months it was lighter. The heavier than normal precipitation of June and the comparatively slow spring run-off, which allowed considerable water to soak into the fall-plowed soil, would have had good results had not a severe drought occurred during the greater part of July. The period of drought was broken by a series of torrential thunderstorms, the heaviest of which did not pass over the station. On July 22, during one of these storms, one-third of the total precipitation for the month fell in less than 10 minutes.

August was not as satisfactory from an agricultural standpoint as the meteorological data seem to indicate. Grain that did not ripen before the wet period sent up green tillers which apparently held back the normal maturity of the remaining heads, a few of which had started to change color. Due to dense smoke from the heavy forest fires that swept across the Yukon Valley above the station and to fog which almost completely obscured the sun, the grain had little chance to dry after it was cut. Barley No. 20b, which was so early in maturing, started sprouting while in the shock. During the greater part of August, alfalfa that had given promise of maturing seed early made no progress so far as maturity was concerned.

Ice in the Yukon broke May 19, two days later than the 24-year average date.

Field work for the season started May 9, when the gardens and portions of the higher fields were plowed.

CROP WORK.

One-half acre of Siberian No. 1 wheat was seeded May 14 on a slope of the first bench. The crop was up May 25 and made about an 85 per cent stand. Owing to drought, the growth was slow and poor. Weeds, the seed of which must have been dormant in the soil for at least a year, spread over considerable of the area and made it hard for the wheat to survive. The wheat was harvested August 19, when it gave a yield of 6 bushels.

On May 19 a bench field of 1.2 acres was seeded to Siberian No. 1 wheat. The crop was up by the end of the month, but grew under conditions similar to the former planting of this wheat and gave results that were practically the same as those obtained from the former planting. One-quarter of the field that had been treated with decayed fish offal gave a very vigorous growth of wheat and also a vigorous growth of weeds. Harvested and threshed on the same date as the first planting, this crop made a yield of 18 bushels.

On May 17 a 5-acre field on the second bench was seeded with Black Finnish oats which were up June 2. They made fair growth, attaining a height of 40 inches, but sent up green tillers during the period when the drought was broken by heavy thundershowers, and maturity of the grain was consequently delayed. Harvested September 3, the crop was threshed September 22, when the yield was 31 bushels per acre. A ton of this seed was shipped to the Fairbanks Station during the season.

On the flats approximately 25 acres were seeded in Finnish Black oats for hay. The greater part of this was seeded May 25 and the remainder June 1. The crop first seeded was cut before maturing

in order that a superior quality of hay might be obtained from it. Considerable difficulty was experienced in curing the hay, especially that of the last crop seeded, which made very heavy growth and lodged considerably. The barn was filled with well-cured hay and 11 loads were stacked in the barnyard.

On May 20 a strip of bench land, 0.75 acre in size, was planted with Irish Cobbler potatoes. Blood meal was applied to the field at the rate of 500 pounds per acre, one-half when the planting was done and the other July 1. This bench soil is low in humus content and consequently has very little power to hold moisture from the spring run-off. Blood meal, while supplying the soil with plant food, could not make up for the water deficiency, and shortly after July 1 the potatoes began to dry up. By the time that the rains came fully half the plants had turned brown and the others were too severely injured to completely recover. The field crop was a failure, due to the drought, and the potatoes that were produced will not grade above culls.

The permanent plats of brome grass in the first draw leading from the first bench were cut July 28. The weather was excellent and the hay was cured by July 30. The horses are very fond of this hay, half of which has already been fed.

LEGUMES.

Peas.—May 16–18 the station seeded a field of approximately 6 acres on the first bench land with a standard garden variety of peas known as Alaska. A poor stand and exceedingly poor growth were obtained, many of the vines not exceeding a height of 6 inches. During the rains of the late summer many peas sent up new shoots and a large amount of seed which had evidently been too dry germinated. The secondary growth was better than the first and produced peas which were large enough for table use before hard frosts occurred. The first stand bore some excellent seed, about 200 pounds of which was picked by hand. During the year 100 pounds of this seed and 100 pounds of that produced in 1920 were shipped to Fairbanks.

Alfalfa.—As usual, the hardy yellow-flowered alfalfa (*Medicago falcata*) came through the winter without injury, except that caused by mice. (Pl. VIII.) The damage was worse on the first bench, where 5 per cent of the plants were injured, but little or no damage was done on the flats. Although it was not as heavy as in some other years, the crop made a good growth. By July 1 the plants had started to bloom, those on the flats starting as soon as the plants on the first bench. Some of the seed having started to turn brown September 1, it was picked, but the main crop was not harvested until late in the month, when further seeds maturing was stopped by frost. After the individual seed-bearing plants were cut by hand, they were transferred to the barn and adjoining sheds and stored on frames. The seed will be threshed during the winter and a yield of perhaps 30 pounds obtained. This seed was gathered from the older plats of the flats and first bench. The plats seeded last year and this year have not yielded any seed.

Another planting of *Medicago falcata* was made on the bench in the spaces between last year's seeding and the Grimm variants. A

seeding of this variety was also made on the flats in the spaces between large plats of the same variety. The total additional ground seeded was about $1\frac{1}{2}$ acres.

The alfalfa variants which were selected from the Grimm field and seeded in 1917 are apparently hardy and making a more vigorous growth than is *Medicago falcata*. They do not, however, mature seed as readily as the other variety and consequently produced only a small amount this year. This seed has already been transferred to the Fairbanks Station.

Dry-land Grimm alfalfa, received from Benkelman, Nebr., and seeded in 1920 on the first bench, may be regarded as a complete failure. The few plants which survived the winter made very poor growth, none of which equaled that of the first season.

Vetch.—The variety *Vicia cracca* has again wintered well, although some of it was damaged by mice. As usual the plants were very late in starting growth, but after starting they went forward rapidly and produced a fair growth of vine. Nearly all of the seed matured and was of good quality. It was picked by hand, sacked without threshing, and shipped to Fairbanks before the close of navigation. Additional ground, approximating an acre, was seeded in this valuable legume. The new seeding adjoins the old, making the whole plat a long, rectangular field.

Clover.—As usual, *Trifolium lupinaster* wintered well and made poor growth. It is not holding its own against the invasion of alfalfa from an adjoining field. Seed began to mature early in August and a small quantity was picked by hand August 16, but the greater portion was allowed to fall to the ground with the hope that it would germinate and fill in the openings that were being taken over by the alfalfa.

TEMPORARY EXPERIMENTAL PLATS.

(PL. VIII.)

WINTER GRAIN.

Rye.—A planting of the variety Rosen was made in one row on July 20 and of Hogot on one-fourth acre on August 10, 1920. Both varieties were harvested August 9. Hogot was damaged by mice, but, so far as could be observed, the crop was uninjured by cold. Only 4 plants of Rosen survived the winter. It is thought that the remainder were killed by mice and not by the weather. The test made with Rosen was far from satisfactory, but the few plants that were produced apparently were inferior to Hogot, being less vigorous in growth and shattering rather freely.

SPRING GRAIN.

WHEAT.

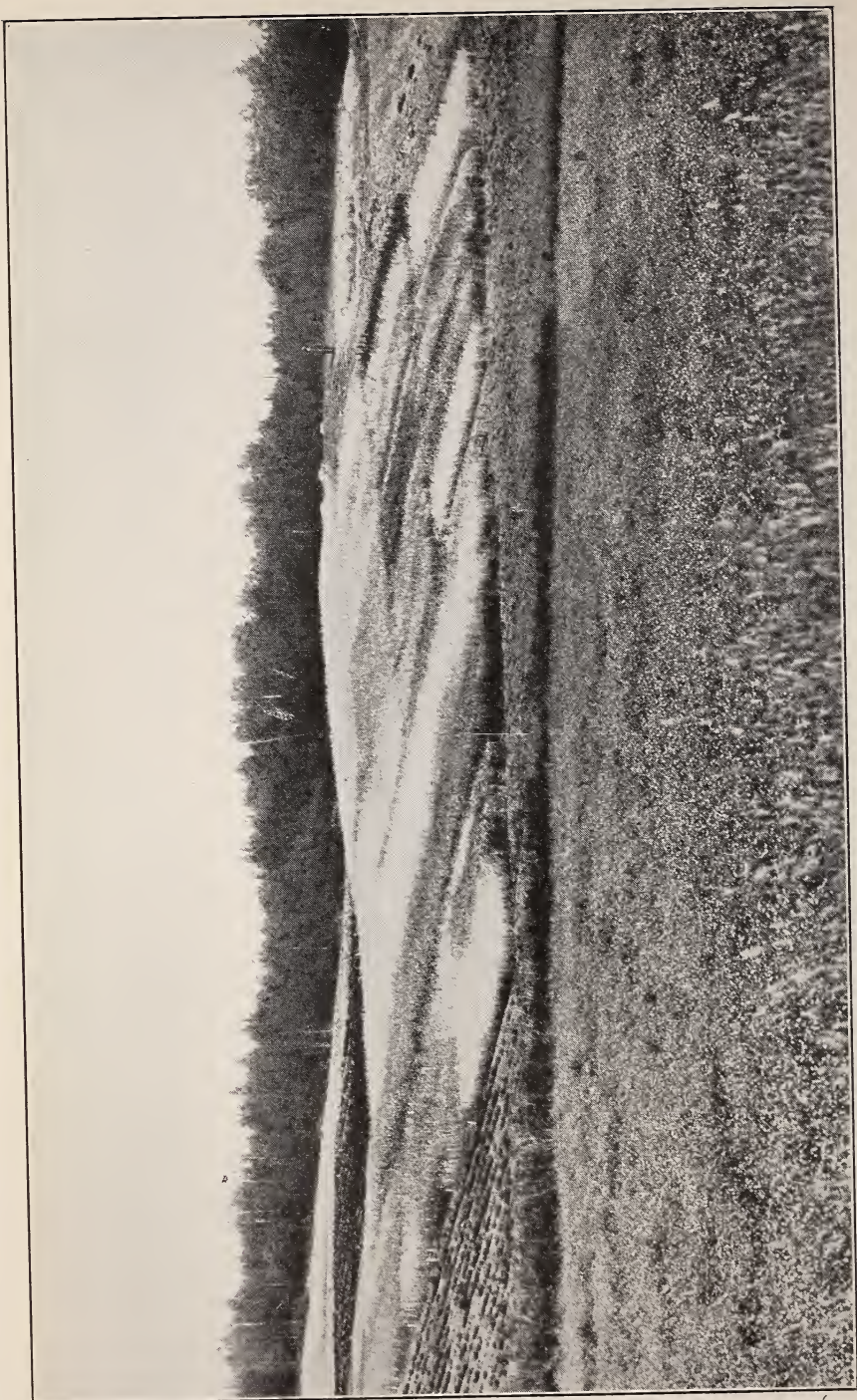
Plat No. 8, Siberian No. 1.—Located at the edge of the first bench and on a site that is very similar to that of the other plats, plat No. 8, seeded May 14 in Siberian No. 1 wheat, was used to serve as a check. The crop was up May 25, headed July 7, and harvested August 19. It germinated very unevenly and lacked uniformity in maturing.



FIG. 1.—HARVESTING BARLEY, HYBRID NO. 19-3, FAIRBANKS STATION, 1921



FIG. 2.—TOBACCO GROWING AT FAIRBANKS STATION, 1921.



EXPERIMENTAL GRAIN PLATS, WITH ALFALFA IN FOREGROUND. RAMPART STATION, 1921.

Harvesting was delayed as long as possible to give the stragglers a chance to mature.

Plat No. 9, hybrid No. 63a.—Seeded May 12, this crop was harvested September 2. It was very much like its Romanow parent, and with the exception of a few green tillers matured evenly. Being too long in its growing period, however, it fails to mature in a short season.

Plat No. 10, hybrid No. 62a.—Seeded May 12, this hybrid was harvested September 2. This short, bearded wheat showed no superiority over its Siberian No. 1 parent, which it resembled in habit of growth. It required a considerably longer season for growth than did Siberian No. 1, however.

Plats Nos. 11 to 13, hybrid No. 63a.—Seeded May 12, the earliest of the three selections in this series of bearded wheat was harvested August 17 and the latest August 27. All were larger than the Siberian No. 1 parent and seemed to inherit its earliness to a marked degree, the earliest selection maturing in nearly the same period as Siberian No. 1.

Plats Nos. 14 to 16, hybrid No. 64a.—The selections in this series were similar to No. 63a. Seeded May 12, the first selection was harvested August 7 and the other two were harvested August 22. All were earlier than hybrid No. 63a. The earliest was scarcely 2 feet high, but the other two were fully 30 inches high.

Plat No. 17, Omega (No. 408).—This short, bearded variety of Siberian wheat was early, maturing in 87 days. It did not average 2 feet in height and showed no superiority over Siberian No. 1, which it resembled in habit of growth.

Plat No. 18, Blue Ribbon (No. 437) or Preston.—This variety, grown here for the first time, matured in 113 days. Yellow, bearded, shattering freely, and only little more than 2 feet in height, it does not appear very promising.

Plat No. 19, Wisconsin Wonder (No. 435) or Prelude.—This variety, which was received with the Blue Ribbon and durum (No. 436) varieties, required 112 days to mature. It was less than 2 feet in height, had yellow chaff and short, stiff, nearly black beards. The kernels were plump and hard.

Plat No. 20, Durum (No. 436).—Possessed of several very desirable characteristics, this variety failed to mature. It had a disadvantage in that its beards were exceedingly long and heavy. The crop reached a height of nearly 3 feet and bore heads which were so heavy with grain that they were fairly weighted to the ground, notwithstanding the strong straw. Although a failure from the standpoint of crop production here, this variety may be of value for hybridization work on account of its large heads and long, plump kernels.

Plat Nos. 21 to 25, hybrid No. 30a.—This hybrid again demonstrated its adaptability. (Pl. IX, Fig. 1.) Reaching a height of 2½ feet, this practically beardless, medium-early hybrid, with its large kernels and large heads, presents a combination which makes it of considerable value. The latest of the selections matured in 107 days, while the other four matured in 102 days.

Plats Nos. 31 to 55, hybrid No. 30a.—This hybrid was grown in 25 rows in a head-to-row test. The rows were uniform in length, with the exception of the first row, which was the shorter. Taken as a

whole, the plats did not mature on account of the open method of planting and consequent very vigorous growth of individual plants.

Plat No. 76, hybrid No. 63a-7-1.—This selection showed a tendency to produce lighter colored glumes and shorter beards than the rest in the series. Fully 10 per cent of the crop was not mature when harvested September 8, 118 days after seeding. The kernels had been planted separately, being placed 3 inches apart.

Plat No. 77, Early Triumph (No. 449).—This variety, tested here for the first time, was planted in a test row with the kernels set 3 inches apart. The majority of the heads failed to mature. Apparently, this wheat was a pure line of beardless spring wheat, but it did not attain a height much over 2 feet. The heads were very compact and the kernels were very plump.

OATS.

Plat No. 27, Canadian (No. 416).—This oat was sown May 16. The seed when tested showed low germination, and when planted germinated slowly and unevenly. On June 5 some of the plants were still coming up. The stand was far from perfect, falling short 20 per cent or more. The growth was vigorous, reaching a height of 38 inches, but the crop ripened very unevenly and sent up many green tillers. It was harvested September 8, when a majority of the heads had matured.

Plats Nos. 29, 30, 124, and 125, hybrid No. 51a.—The oats in this series were multiflowered, hull-less, and had a strong tendency to be white, only one selection showing any tendency to be black. This series is reasonably early, every selection maturing before August 22. The crop reached an average height of about 3 feet and the heads were of good size. It gives promise as a heavy yielder. Enough seed is on hand for a test under field conditions during the coming season.

Plat No. 123, hybrid No. 50a.—Seeded May 13, this crop was harvested August 13. The hybrid was multiflowered, white, and hull-less. The plat was 35 drill-rows wide and 2 rods long, and gave considerable seed for further testing.

Plats Nos. 126 to 128, hybrid No. 52a.—This series was variable, one plat averaging well over 3 feet in height and another not much over 2½ feet. The latter produced oats having a tendency to be black, while that of the former was distinctly white and rather stable. All of the oats in the series are bearded and paniced. Two of the plats were cut August 22 and the other was cut September 2.

Plat No. 120, Celog I (No. 421).—This variety, grown here for the second time, again demonstrated its earliness, maturing in 86 days. It produced straw which reached a height of 2½ feet and yellow kernels that were small.

Plat No. 130, Celog III (No. 424).—Maturing in the same number of days as Celog I, this variety was slightly longer in the straw than the latter, but its kernels were almost as small. The outstanding good feature of the oats in the series is that in the adverse season of 1920 they both matured seed which germinated perfectly.

Plat No. 131, Pearl (No. 418).—Seeded May 13 and harvested August 22, this oat reached an average height of 3 feet and bore fair-sized heads having medium-plump, white kernels.

Plat No. 132, Norway (423).—This slender, gray-kerneled oat matured before the middle of August, but produced slender straw reaching a height of only 2½ feet.

Plat No. 133, Norwegian (No. 117).—This paniced, bearded black oat, grown here for the seventh time, was a check on the newer oats. It reached an average height of 32 inches and was harvested August 22.

Plat No. 134, hybrid No. 36a.—Harvested August 7, this hybrid ranked among the earliest maturing varieties. Averaging over 2½ feet in height and having good-sized side heads and medium-plump kernels, this variety promises well for poor locations and short seasons.

Plats Nos. 135 to 142.—These plats were sown with the varieties Gold Mine No. 444, Wisconsin Pedigree No. 415, Olds' Scottish Chief No. 442, Olds' Imperial Yellow Kherson No. 440, Wisconsin Pedigree No. 1, Rampart No. 414, Silver Mine No. 441, Olds' White Kherson No. 439, and Regenerated Swedish Select No. 443, respectively.

Nothing of merit was noted about any of these varieties. All were late, not maturing before September 1, excepting Nos. 440 and 439, which matured August 22 and 27, respectively. The only hybrid to exceed 27 inches in height was No. 414, which reached a height of 33 inches. All heads and kernels were small, uniform in growth, and white.

Plat No. 143, Rampart No. 365 (Russian No. 353).—Paniced, white, and beardless, this oat reached an average height of 31 inches and was harvested August 22. The kernels were medium in size.

Plat No. 144, Hansen (No. 240).—This large, white, heavy-husked oat was grown to serve as a check. It produced small kernels and reached an average height of nearly 4 feet. The crop was mature August 20.

Plat No. 145, Black Finnish (No. 118).—A small plat of this variety was grown along with the other plats to serve as a check. The crop reached a height of 42 inches and was mature August 21.

Plat No. 146, oat No. 395.—This beardless, black variety gave a full stand and reached an average height well over 3 feet. Its very plump kernels were mature by August 22.

Plat No. 147, Yakutsk (No. 112).—Grown as a check, this variety gave poor germination, making not much over half a stand. It was mature August 22, averaged well over 3 feet in height, and had a slight tendency to lodge.

Plat No. 148, hybrid No. 36a.—Grown lower on the slope from the first bench than the crop on plat No. 134, this hybrid gave slightly greater length of straw than the latter and was mature August 12.

Plat No. 149, Canadian (No. 416).—This plat of two rows was seeded earlier than plat No. 27 and under slightly better conditions. It served as an additional check for plat No. 27. Seeded May 14, the crop produced an 80 per cent stand which fully matured August 21 at a height of over 3 feet.

Plats Nos. 202 to 205.—These plats were planted to Victory, Gold Rain, and Leader (Rampart No. 451) oats, the seed of which was not received until late May. The plantings were made May 30. All varieties were white and about equal in earliness, maturing the greater portion of their seed before hard frost set in. The only

oat of superior qualities was Leader, which reached a height of 38 inches and produced heads of open habit of growth and kernels of good size. These varieties will be tested again.

BARLEY.

Plat No. 5, hybrid No. 20b.—This extremely early, beardless barley was sown on bench land May 12 and was up May 21. The greater part of the 0.05-acre plat was mature before the end of July, but harvesting was delayed until August 4 because some of the crops showed a green streak. Unfortunately, this hybrid had weak straw and heads that easily shattered. Being an early variety, however, it is recommended for seeding where it is desired to grow a beardless variety under adverse conditions.

Plat No. 6, hybrid No. 19-3 (Pl. IX, Fig. 2).—Seeded May 12, this beardless, hull-less, light-glumed strain was mature August 15 and produced strong straw. The area of plat No. 6, together with that of the closely related striped glumed strain, was about 0.5 acre, sufficiently large to grow seed for a field of considerable size next season.

Plat No. 7, hybrid No. 19-3.—This dark-striped glumed strain was very similar to the light-glumed strain above mentioned, but had the advantage of being slightly longer in the straw and of producing slightly heavier heads than the latter. It has shown a small percentage of sterile seed and requires about four days longer to mature than the light-glumed strain.

Plat No. 26, hybrid No. 19-3.—This plat was sown May 16 with seed of the same origin as that used in plat No. 7. The stand did not exceed 80 per cent, and tillered considerably. When harvested, September 8, fully one-fourth of the crop had not matured.

Plat No. 28, hybrid No. 20b.—In this plat 28 drill rows 8 rods long were sown May 16 with seed of hybrid No. 20b. The seeding was widely separated from the first seeding made in plat No. 5, and in addition to increasing the seed supply this plat served as a check for many hybrids and other grains that were growing in smaller plats adjoining. The crop reached an average height of 3 feet and was harvested August 9.

Plats Nos. 56 to 59, hybrid No. 44c.—Grown in a head-to-row test to observe its stability, this hybrid made uniform growth, but produced rather small heads which matured just in time to avoid the heavy frosts.

Plats Nos. 60 to 66, 67 to 75, 81 to 96, and 97 to 117.—These plats were planted to hybrids Nos. 68, 67, 65, and 66, respectively, all of which had as one parent a variety from the Highmore Station, S. Dak., which was without hoods and either beardless or with very short beards. No seed of the parent was planted this year because that produced last season was not viable. The parent produced heads that shattered easily, an undesirable and rather dominant characteristic which has been transmitted to practically all of the progeny. No great vigor was shown in the many variations of this, the second, generation. An instance of stability was noted in the No. 68 series where hybrid No. 19-3 was the other parent.

The new hybrid No. 68a-4 is very similar to No. 19-3, but lacks the vigor of the parent and shatters easily. Hybrid No. 67b-1 was

very similar to No. 68a-4 and is another barley of apparent stability. Perhaps the most important result was observed in hybrid No. 68g-1, which, apparently stable, exhibited the desirable characteristics of its Highmore parentage and had greater vigor. All of these hybrids will be worked over by hand, and those having the most vigor and least tendency to shatter and showing some degree of stability will be selected for further trial.

Plats Nos. 79 to 80, hybrid No. 14a.—This hooded hybrid, lacking in stability and bearing very slender heads, exhibited its usual vigor of growth in length of straw and head. In spite of its lack of stability, hybrid No. 14a is worthy of further trial.

Plat No. 118, hybrid No. 20b.—This plat of 32 drill rows 2 rods long was sown to the progeny of a double-kerneled selection in 1917. The crop was apparently more vigorous than was the same hybrid in other plats, but not as early as the latter, maturing August 27.

Plat No. 119, hybrid No. 14b.—Nearly 3 feet in height, hooded, hull-less, yellow, 6 rowed, stable, and of medium earliness, this hybrid produced weak straw, about 40 per cent of which lodged.

Plat No. 120, hybrid No. 14b.—This bearded selection of the same hybrid as was grown in plat No. 119 exhibited weakness of straw, nearly three-fourths of which lodged. Lodging was due to considerable extent to its undesirable heavy beards.

Plat No. 121, hybrid No. 14a.—Hooded, yellow, hull-less, 6-rowed, stable, and medium early, this hybrid had many desirable characteristics, but was less vigorous than No. 19-3 and inferior to that hybrid in almost every other respect. To date it has shown up the best of any of the No. 14 series of hybrids.

Plat No. 122, Olds' Montana (No. 438).—This white, hull-less, 6-rowed type matured slightly before the end of August. Both heads and straw were short, the total height being a little over 2 feet.

Plat No. 151, hybrid No. 44c.—This hull-less, beardless hybrid, sown May 14 in an increase plat, was harvested August 22.

Plat No. 152, hybrid No. 20b.—This hull-less selection was as early as the hulled barley. While somewhat weak in the straw it grew to an average height of well over 3 feet and was mature August 5. It takes first place among the hull-less barleys, so far as earliness is concerned.

Plat No. 153, Hansen (No. 116).—This early, bearded barley, grown for many seasons, was a check on the newer types. It was harvested August 5 at a height of 31 inches.

Plat No. 154, Rampart No. 120 (Hull-less, S. P. I. No. 12709).—Growing to a height of only little over 2 feet, this barley was harvested August 13.

Plat No. 155, hybrid No. 1a.—Producing about 10 per cent less than a full stand, this hybrid did not mature until early in September. It reached an average height of over 3 feet.

Plat No. 156, hybrid No. 19-3.—As a further test in another location and to increase its seed supply, this dark-striped glumed hybrid was sown in drill rows May 14. Only little more than three-quarters of a stand was obtained, and when the crop was harvested September 8, about 10 per cent of it was immature.

Plat No. 157, Rampart No. 124 (Pamir, S. P. I. No. 18922).—For some unaccountable reason this barley, heretofore one of the earliest, did not mature until August 17. This was nearly two weeks later

than a selection of No. 20b planted within 10 feet of it on the same slope. The crop apparently made a full stand, but did not average much over $1\frac{1}{2}$ feet in height.

Plat No. 158, hybrid No. 14a.—This hybrid, a 2-rowed selection, matured early in September. All heads were long and slender, but some 6-rowed heads appeared, showing that the variety is not stable.

Plat No. 159, hybrid No. 14b.—This hybrid matured but made a poor stand, and consequent green tillering delayed the date of maturity until September 1. Grown in a slightly different location than the other sections of the same hybrid, the crop did not lodge at all.

Plat No. 160, hybrid No. 14e.—This 2-rowed black hybrid matured August 22, but a few 2-rowed bearded plants sprung up with the rest, showing that the hybrid is not yet stable.

Plat No. 161, hybrid No. 14a.—Hooded, hulled, yellow, 2 rowed, and stable this selection matured August 7 at an average height of 31 inches.

Plat No. 162, hybrid No. 21a.—Hooded, hulled, black, and 2 rowed, this hybrid was harvested August 13 at a height of 37 inches.

Plat No. 163, Manshury (No. 136).—Grown for the fourteenth year, this barley was used as a check. Seeded May 14, it was harvested August 27 at a height of 32 inches.

Plat No. 164, Mjös (No. 426).—This 6-rowed type of barley was greatly inferior to the Dönnes, which was received from Norway along with it. About 90 per cent of the heavily bearded heads lodged.

Plat No. 165, Dönnes (No. 427).—This barley matured August 13 at a height of nearly 3 feet. On account of its heavy beards and hulls, this barley is of no great value, except perhaps for hybridization work.

Plat No. 166, hybrid No. 23a.—Black, hooded, hull-less, 6-rowed, and of a fair height, this hybrid matured August 20. It can be recommended for growing wherever a black barley is desired.

Plat No. 167, Rampart No. 130 (Boehme, S. P. I. No. 19851).—Grown as a check, this reliable barley was harvested August 7 at a height of 28 inches.

Plat No. 205, Bark (No. 452).—This barley was seeded May 30. It is a bearded, hulled 6-rowed type which showed no points of superiority over barleys grown here before. The first hard frost of September caught a small portion of it that had not matured.

HEMP.

Plat No. 150, hemp No. 307.—Planted May 14 and harvested September 9, this hemp reached a height of about 2 feet. Many of the seeds did not start growth until late June and the stand was consequently very uneven and part immature.

FLAX.

Plat No. 168, flax No. 303.—Due to dry weather and to the rather poor seed produced under the adverse conditions of 1920, this flax made a poor stand, 20 per cent of which failed to mature. It was harvested September 2 at a height of less than 2 feet.

POTATOES.

Plat Nos. 171 to 173.—These plats were planted with the varieties Alaska Beauty, Clark's Seedling, and Red River Triumph, respectively. The plats were a part of the main potato field that was planted with Irish Cobbler and furnished a good check on the other varieties. With the exception of Alaska Beauty, none gave such good results as did Irish Cobbler. Alaska Beauty, while not giving as large tubers as Irish Cobbler, produced an abundance of dark purple-skinned potatoes having good shape and shallow eyes.

Plats Nos. 175 to 200.—These plats were given to Irish Cobbler tested in hill units. A selection from the 26 best hills of last year was used for these tests. The superiority of these over the adjoining rows of unselected Irish Cobbler was very noticeable. A further selection from 25 hills was made this fall for planting next season. Vigor of vine, size, uniformity, and number of potatoes per hill were points sought in making the selection.

VEGETABLES.

Plats Nos. 1 to 4.—These plats, which were located on a slope of the first bench, were planted May 7 to sugar beets of the varieties Dippe, Kleinwanzleben, and two unnamed sorts. One of the unnamed sorts gave the best stand of all and the other the poorest. All varieties were yellow leaved and struggled for existence until the rains of late July. Not over 25 per cent of the roots reached marketable size.

Beets and carrots, for seed production, started in small tins and kept in the house until the weather sufficiently moderated to permit of planting in the open, were injured by cold winds. The carrots produced a few seed and the beets none. The shoots of the cabbage, which was started like the beets and the carrots, suffered from cold to such an extent that they did not recover in time to produce much seed.

SMALL FRUITS.

Strawberries.—The season was unfavorable for most berries. While numerous strawberries set on the Sitka hybrid No. 275, many actually dried on the vines before maturing. The original plat in the first draw from the first bench was the most productive, yielding three fair pickings. Plants on the plats on the high bench lands having practically all died, they were replaced by alfalfa. The soil of the plat on low ground is apparently too rich, since it produced a very vigorous growth of vine bearing only few berries. Only one picking was produced from this plat. The plants for the most part were allowed to set runners freely to supply an abundance of young plants for distribution another spring.

Raspberries.—The plat of the variety Cuthbert did well in that it produced considerable fruit of good quality. Some of the plants were frozen back at least one-fourth way and others completely. No protection was given them.

That the season was hard on berries was very clearly shown by the plats on which selected wild raspberry stock was planted. Most of the berries of these plats dried on the bushes and the few that reached maturity were too wormy to be of any value.

THE GARDEN.

The showing made by the garden was excellent. The garden soil, having a higher humus content than most of the field soil, held moisture better and consequently suffered less from the drought than they did.

Carrots, parsnips, lettuce, beets, and rutabagas were planted May 3 and produced abundant crops.

String beans large enough for table use were produced by August 1, and the plants continued to produce into September.

Of the three varieties of peas that were planted May 11 Gradus produced the first crop July 4, closely followed by Alaska and Nott's Excelsior, in the order named. By the end of July the plants had started to dry, but they sent up new shoots bearing large edible peas before the first killing frost.

Early Jersey Wakefield cabbage and Snowball cauliflower produced fine, early heads which ripened so rapidly that they had to be harvested and canned. Copenhagen Market cabbage produced fine, large heads which did not split and were ideal for winter storage.

Six rows of Irish Cobbler potatoes were planted in the garden May 17. The crop was up May 29 and was dug September 5, when the yield was at the rate of nearly 15 tons per acre. Although the larger part of the garden had been plowed the previous fall, an additional strip at the upper edge was worked just before planting time. This strip was of practically the same texture as the rest of the garden, yet it was decidedly drier when planted. Due to the lack of moisture, all vegetables planted in it came up slowly, and the potato vines dried before frost came.

FLOWERS.

An abundance of flowering plants, started early in the house, were transferred to the greenhouse. Many of them were ready to bloom when they were transplanted, and a succession of splendid flowers was produced until the hard frosts of September stopped growth.

Wallflowers, gladioli, and iris were tried at the station for the first time. The first two varieties produced many flowers, but the bulbs of the gladioli, although grown in rich soil, were rather small. Both the German and the Japanese iris, the roots of which were brought from the States in the spring, made good growth, but neither produced flowers. They have been left in the ground with only a few branches to serve as protection in keeping the snow from being blown and the ground left bare.

Perhaps the finest display of all the flowers was that made by a large bed of asters. Each plant produced an abundance of large flowers which fairly weighted them to the ground.

REPORT OF WORK AT KODIAK STATION.

By W. T. WHITE, *Assistant in Charge.*

WEATHER CONDITIONS.

Taken as a whole, the year ended October 31, 1921, was favorable for live-stock raising on Kodiak Island. Viewed by seasons, however, many of the usual weather factors inhibiting or limiting the



FIG. 1.—SPRING WHEAT, HYBRID NO. 30-A. GROWN AT RAMPART STATION.



FIG. 2.—BARLEY, HYBRID NO. 19-3. GROWN AT RAMPART STATION.



FIG. 1.—PUREBRED GALLOWAY COW, BERTHA A, 13 YEARS OLD. GOOD MILKING QUALITIES.



FIG. 2.—CROSSBRED HEIFER CALF OF ABOVE. BORN JUNE 24, 1921. SIRE, PUREBRED HOLSTEIN.

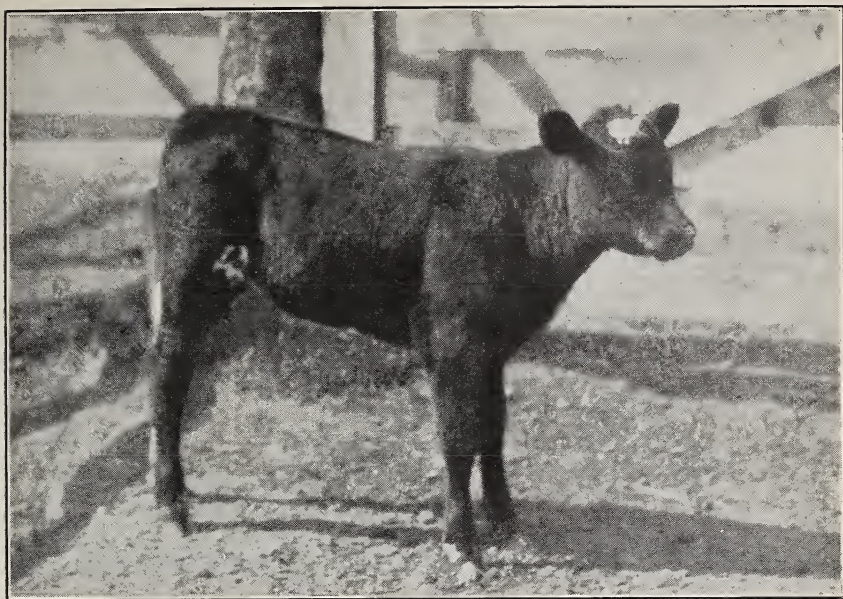


FIG. 1.—CROSSBRED HEIFER. BORN APRIL 22, 1921. SIRE, PUREBRED GALLOWAY; DAM, PUREBRED HOLSTEIN.

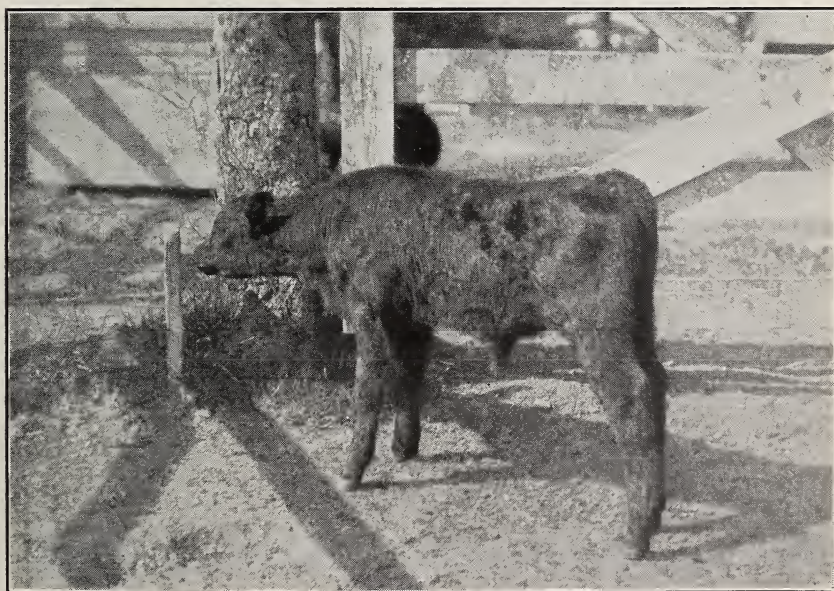


FIG. 2.—CROSSBRED BULL CALF. BORN MAY 3, 1921. SIRE, PUREBRED GALLOWAY; DAM, PUREBRED HOLSTEIN.



FIG. 1.—THREE-QUARTERS CROSSBRED BULL CALF. BORN JANUARY 19, 1921.
SIRE, PUREBRED HOLSTEIN; DAM, CROSSBRED GALLOWAY-HOLSTEIN.



FIG. 2.—THREE-QUARTERS CROSSBRED BULL CALF. BORN MARCH 31, 1921.
SIRE, PUREBRED GALLOWAY; DAM, CROSSBRED GALLOWAY-HOLSTEIN.

industry were in evidence. During the period between December 6 and March 30 the ground was covered with snow or sleet and winter grazing was impossible. Snow lay in drifts on the fields and grass flats until the first week in May. Although the spring opened late, oats planted for hay between May 10 and May 18 came up in from 16 to 22 days and made the slow growth characteristic of grains planted here early in the season.

The total snowfall, 47 inches, and the depth of the snow on the ground at any time were greater than normal. From February 7 to February 23 the depth was 22 to 31 inches.

Exceptionally high westerly winds in February, March, April, September, and October damaged roofs, lightly constructed buildings, and standing timber.

All of August and a few days in September were favorable for hay making, but as is usually the case, the temperature remained too low in September to permit of curing the hay, even when the sun shone all day.

HAY AND SILAGE MAKING.

Native bluetop (*Calamagrostis langsdorfi*), which forms over 90 per cent of the upland hay put up on Kodiak Island, made better growth this summer than usual on the north end of the island. A difference of two weeks was noted in the date of blooming of the bluetop on the hillsides at Kodiak and that on the flats at Kalsin Bay, 16 miles distant. Such variation was probably due to the disappearance of the snow on the flats at a later date than at Kodiak.

The native plants *Elymus mollis*, a beach grass or beach rye, and *Carex cryptocarpa*, a sedge known as three-cornered grass, are the principal grasses used for silage making. The former attained a height of 6 inches on the tide flats at Kalsin, where there was no snow, before that at Kodiak showed a green sward. The sedge attained a height of from 16 to 20 inches during the season, which was an increase in growth of 4 or 5 inches over that made on the same land a year ago. The growth made by the sedge, it is believed, is largely dependent upon the amount of debris, consisting of broken kelp, shell, and decomposed spawn fish, that is deposited by the high fall tides.

NATURAL RESTORATION.

Considerable increase is noted in the growth of a number of grass and forage plants on the ash-covered areas. Decided improvement was observed around the rim of two ash-filled lagoons and the dense growth had spread inward about 6 feet during the year. On some of the areas which were densely covered with fireweed (*Epilobium angustifolium*) during the summer of 1919 it was observed that the fireweed had been almost completely replaced by wild bluetop. These areas were cut over for hay in 1919, 1920, and 1921. Few, if any, plants had matured seed on these areas, and the grass had spread from adjacent areas that had been seeded.

CATTLE.

During the summer, shipments of surplus and breeding stock were made as follows: 20 head (butcher stock), Alaska Engineering Com-

mission, Anchorage; 1 purebred Holstein-Friesian bull, Palmer; 1 purebred Holstein-Friesian bull, Ketchikan; 1 purebred Holstein-Friesian bull, Anchorage; 5 purebred Galloway heifers and 1 bull, transferred to Matanuska Station; and 1 aged Holstein-Friesian cow, sold to resident, Kodiak.

Cattle wintered at station.—The following lot of cattle was wintered at the Kodiak Station: 18 Galloway cows, 5 Holstein-Friesian cows, and 3 bulls (a Galloway, a Holstein-Friesian, and the result of a cross between the Galloway and Holstein-Friesian), 6 Galloway heifers, 2 Holstein-Friesian heifers (2 years old), 2 yearling Galloway bulls, 2 yearling Holstein-Friesian bulls, 5 cross Galloway-Holstein bulls, and 10 calves dropped the previous spring.

Crossbreeds.—At the Kodiak Station the problem receiving first consideration from an experimental angle is the production of a utility cow for Alaska. In the hope of obtaining a dual-purpose animal combining a rugged constitution, milk production, and the ability to rustle, the station is making reciprocal crosses between Galloways and Holsteins of registered stock. (Pls. X, XI, and XII.) A total of 23 crosses have been made to date, but, unfortunately for the progress of the work, 65 per cent of the progeny dropped were bulls. Of the 8 females, 4 have calved and have been milked through one lactation period. In milk production and general conformation these 4 heifers give much promise. Due to the nonavailability of an F_1 bull, the heifers were bred to purebred sires to determine their milking ability as quickly as possible. A dual-purpose F_1 bull was ready for service for the second breeding, and the first F_2 calf, the sixteenth bull, was dropped October 3, 1921.

Tuberculosis.—No reactors or suspected animals having been found in the herd, which was tested for the last time in July, 1921, it is certain that the herd is again free from tuberculosis.

SHEEP.

The sheep, numbering 17 ewes, 2 rams, and 3 wethers, were transferred from Kalsin Bay to Near Island on May 1, and after being sheared and dipped they were turned at large upon the island to graze for themselves. Unfortunately, 9 of the sheep were killed by dogs which swam across the narrow strait separating the island from the village of Kodiak. Some of these dogs were shot in October and depredations ceased.

The station has no facilities for wintering sheep since the Kalsin Bay substation was abandoned. There being no pens and shelter for them at Kodiak, 11 of the flock were disposed of. Of the 16 lambs dropped in March 12 lived.

ADDITION TO KODIAK RESERVE.

During the summer approximately 320 acres of public domain were surveyed for the purpose of adding to the Kodiak reserve. This area would afford pasturage and land for the growth of forage crops necessary to maintain the stock on hand.

REPORTS FROM SEED AND PLANT DISTRIBUTION.

The following letters, giving experiences of settlers located in various parts of the Territory, will probably be of interest to those who wish to know something of farm life in Alaska. The distribution of special varieties of seed furnished by the United States Department of Agriculture is a great boon to isolated settlers and prospectors, who are not in touch with seedsmen and often do not know to whom to send for seed.

W. E. McKinney, Chisana.—This mail I received the garden seeds and your annual report of the stations, both of which I appreciate. Our garden did not do as well as it did last year because the summer was cloudy and cold. Chisana is between 4,500 and 5,000 feet above sea level, which is timber line and hardly in the agricultural belt. It snows here every month of the year, and in August we have some very severe frosts. Hardy vegetables, like Petrowski turnips, radishes, and lettuce, however, make very good growth, and carrots and parsnips do very well.

Henry Missapowitz, Bettles.—I received some of the seed and the publications issued by the Alaska stations, for which I am very thankful. Although far north of the Arctic Circle, we are raising our own vegetables. Every summer my crop of potatoes weighs about 1,000 pounds and the turnips (Petrowski) 1,000 pounds, while there are carrots, beets, and other vegetables in abundance. The Petrowski turnip, especially, is a great blessing to the country. Could they be improved in starch content they would excel the sweet potato of the South.

The Alaska stations are doing a very great work in giving us seed and advice on how to grow it. I was born in Lithuania and remember when the farmers of 40 years ago made delicious sirup from carrots. I shall try to make some sirup to use in place of sugar, which is 40 cents a pound. For this reason I beg the department to send me one-fourth pound of carrot seeds, of the sweetest variety obtainable. Please send it through first class, otherwise I will not receive it until next summer, and please tell me how sirup from sugar beets is made. I will report my success to the stations in order that other people may be encouraged to make their own sirup. A few years ago I raised about 1,500 pounds of carrots.

Titus N. Spaulding, Franklin.—I have received the package of seeds which you sent me. The strawberry plants that you requested be sent me from the Rampart Station reached me in July, but all were dead. I now have three plants remaining from the lot you sent me last year and one new plant that was obtained from a runner put out last summer. The new plant and one of the old plants are putting out runners, but do not seem to be doing very well. They have produced no blossoms as yet. I am taking good care of them and hope to get a bed of bearing plants from them. It seems to me that if a little dirt were left on the roots they would stand shipment much better than has been the case. I will report later on the berries.

F. Forrest Berry, Homer.—I had a splendid crop this summer and never saw such potatoes as I raised here this year. No frost occurred between April and October to hurt the crops. The more I cultivate my land the better it becomes. This summer I bought two cows. The rutabagas and other roots were splendid, and I hope you will send me a lot of turnip seed early in the spring of 1922. I have cleared enough land to raise tons of turnips, which will be converted by the cows into rich, sweet milk. Some of the poppy seed you sent me lived over the winter in the ground and produced a beautiful bed of flowers this summer. Please send me some more of the seed next spring. The rosebush bloomed and the currant bushes bore fruit.

Holy Cross Mission, Holy Cross.—We received a generous quantity of seed from Mr. Hahn and strawberry plants, which for some unknown reason bore no fruit. We will try to protect them from killing frost this winter and set them in a new place in the spring. The garden products are being harvested at present. The summer has been favorable here for the production of crops, some of which have been excellent. In the greenhouse there were produced over 600 ripe tomatoes and 500 cucumbers.

George L. Stanley, United States commissioner, Kiana.—I want to thank you for myself and for the miners of Kobuk precinct for the yearly contribution

of seeds, which we very much appreciate. I have grown a garden for a number of years and find that it is a means of cutting the high cost of living. At the camp on the creek I have raised seed and have successfully grown Petrowski turnips for a number of years. Some weighed as much as 3 pounds. Of the lettuce, the varieties Early May King, Black-Seeded Simpson, and Salamander do best in this section. The French Breakfast radish does better than the other varieties. Spinach does well and if used while the leaves are young and tender is very fine. Kale grows well and may be salted as kraut and used late in the winter with meat. Onions grown from seed into sets do well if the sets can be kept dry and warm for the following year. Carrots are small and do not do well in this far north. Of the cabbage, the varieties Early Express and Flat Dutch do best, one head weighing 7 pounds. Parsley and collards grow here, but need a little longer season than we have to be raised successfully. Potatoes do not do well here, but can be raised farther up the river. The garden habit has become general, the Eskimos as well as the white people having learned that it pays to raise vegetables. For myself and for my neighbors in this section I can truthfully state that the seed received from you is always appreciated and we are thankful for the yearly donation. May it continue.

F. L. Barrett, Loring.—I am sending by separate mail a few cherries that were taken from a tree in my yard. The plants, with the exception of the roses sent me three years ago, are doing well and the currant bushes are 30 inches high and bore some fruit this summer. The gooseberry bushes are 20 inches high, but have produced only 10 or 12 berries. The six apple trees received last year lived through the winter and one has grown to a height of 3 feet. Most of the strawberry plants are living and three of them have produced a lot of berries, some of which were an inch in size.

R. W. Neily, Nome.—I thank you for the package of turnip seed sent me last winter. Although only a small quantity was sown there were turnips enough left over after the fall supply had been used to do for some time. I appreciate your placing me on your mailing list and ask that you send me another package of turnip seed this winter, together with some lettuce and kale seed.

A. Stoiker, Quinhagak.—I have received another package of seed, for which I thank you. It is always welcome. We hope that the coming season may be better than the last was. The crops this year were more or less failures. In all my nearly 20 years here I never saw such an unfavorable summer as this one. The cool storms and rain prevented the plants from growing.

Three years ago we made new gardens on down-grade bank. The land was practically covered with moss and the ground below did not seem to be very sour and wet. After applying a ton of fish offal to it each year, this land is beginning to bear. If smelts are plentiful in the spring we will use them to fertilize the soil. We had just such ground on another place which would not produce anything. A year after placing two barrels of smelts on it we planted potatoes, which grew and produced $3\frac{1}{2}$ sacks of the finest potatoes. We have just started a greenhouse which will be finished as soon as the weather turns warm.

F. Winter, Susitna.—We had a splendid season, and produced potatoes of fine quality. On some of the potatoes scab appeared. Will you kindly tell me what to do to remedy it? Cabbage produced big heads and the other vegetables did well. The raspberry, gooseberry, and currant bushes you sent me bore good fruit. I transplanted some of the bushes and have a nice berry patch. Have you any literature on mink raising?

E. Collin, Tenekee.—I received in good time the apple trees and berry bushes, all of which did well. I had quite a few strawberries. I am sending you a few potatoes of a kind new to me. I do not know their name. We call them Blue Nose on account of their color and their origin. They came from Nova Scotia. I had two potatoes last spring and harvested about 125 pounds. Some of them were very large, being over 3 pounds. They are good keepers, mealy, and well worth a trial. My Irish Cobbler potatoes are hard to beat in this locality.

Rev. A. Stecker, Quinhagak.—This year we can give a better report of our gardening than we could for many years. It has been a pleasure to see the things grow. There were no storms in July and the weather was warm. August and September were exceedingly wet, but the rains were warm this year and the ground thawed out during the summer more than I ever knew it to do before. The harvest on September 23 was a pleasant surprise. The potatoes were as fine and as large as they were anywhere on the Kuskokwim, where

the ground is good. Turnips grew to good size, even where they were not thinned out, and cauliflower was ready for table use the beginning of August.

Some of it was canned and much of it was in the garden when the cold weather came. Of the cabbage, Copenhagen Market was best, forming round, solid heads weighing 11 and 12 pounds. Cucumbers were produced in the greenhouse, but the tomatoes produced did not amount to much.

I have written you before how hard it is to grow a garden here, where the ground is almost dead. It can be made to give good returns, however, by giving it applications of fish offal in the fall. Just now we have regular spring weather. The people in this vicinity have always wanted gardens but had no chance of getting them. We looked along the river for a suitable spot and about 3 miles from where the willows reach a good size found a place where the grass grew abundantly. After selecting this we helped the men to clear the land, dig it, and set posts. The men are in great hope of having vegetables of their own growing next year.

You promised in your letter to send the seed we need, and the natives would like a generous supply of turnip seed. If you could let us have three or four packages of Petrowski turnip seed I should appreciate it. I think we will be able to plant a large garden. Any other seed which will grow in Alaska will be most thankfully received. Cucumbers and tomatoes would be especially welcome. Is there any chance to get some horse-radish roots?

WEATHER REPORTS.

The following weather reports from all parts of Alaska will enable the reader to get a fair idea of the climate at each place, and it is recommended that they be studied with care.

The writer is indebted to M. B. Summers, section director of the United States Weather Bureau, Juneau, Alaska, who now has charge of the weather service in Alaska, for the data in these reports.

Condensed meteorological reports.

AKIAK. Latitude 60° 52', longitude 161° 23'. United States Weather Bureau, observer.

Month.	Temperature.					Total precipitation.	Number of days.			
	Maximum.	Minimum.	Mean maximum.	Mean minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1921.	° F.	° F.	° F.	° F.	° F.	Inches.				
January.....	31	-47	6.2	-11.4	-2.6		14	7	10	..... 1
February.....	38	-45	8.5	-8.1	.2	0.26	16	3	9	..... 1
March.....	45	-12	29.7	13.5	21.6	2.88	14	2	15	..... 10
April.....	53	-10	36.2	19.4	27.8	.05	12	5	13	..... 4
May.....	69	15	48.5	31.5	40.0	.41	10	5	16	..... 7
June.....	77	37	66.1	44.6	55.3	.33	10	8	12	..... 11
July.....	75	39	62.2	44.2	53.2	2.07	4	7	20	..... 18
August.....	78	.....	61.5	.....	53.1	5.15	0	3	28	..... 21
September.....	64	18	52.5	33.9	43.2	1.51	8	5	17	..... 14
October.....	50	1	35.0	23.6	29.3	1.71	.....	.....	.....	..... 11
November.....	46	-14	32.2	20.7	26.4	1.09	6	16	8	..... 11

AKULURAK. Latitude 62° 30', longitude 164° 35'. Rev. J. M. Treca, S. J., observer.

1921.										
January.....	30	-27	7.5	-8.5	-0.5					
February.....	32	-30	7.4	-7.6	-1.1		14	4	10	.....
March.....	35	-20	23.2	5.9	14.6		5	11	13	.....
April.....	38	-12	26.3	9.7	18.0		12	5	13	.....
May.....	54	11	41.0	28.5	34.8		13	5	13	.....
June.....	75	31	55.4	42.8	49.1		11	7	8	.....
July.....	75	39	59.9	46.7	53.3		.....	.....	.....	.....
August.....	64	42	56.9	48.2	52.6	3.09	1	8	22	..... 23
September.....	58	29	46.8	36.0	41.4	.55	.....	.....	.....	..... 7
October.....	42	17	34.3	23.0	30.2	.97	3	4	24	..... 11
November.....	39	-2	29.5	20.5	25.0	.43	6	10	14	..... 4

Condensed meteorological reports—Continued.

ANCHORAGE. Latitude 61° 13', longitude 149° 54'. Alaska Engineering Commission, observer.

Month.	Temperature.					Total precipitation.	Number of days.			
	Maxi-mum.	Mini-mum.	Mean maxi-mum.	Mean mini-mum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1921.	° F.	° F.	° F.	° F.	° F.	Inches.				
January.....	28	-24	13.2	-4.5	4.4	1.00	11	14	6	12
February.....	45	-30	22.3	1.3	11.8	.50	9	8	11	12
March.....	45	-8	35.5	14.8	25.2	.66	13	10	8	7
April.....	57	12	44.8	22.9	33.9	.25	18	10	2	4
May.....	63	21	56.3	32.4	44.4	.23	16	7	8	6
June.....	77	34	65.2	42.7	54.0	.80	12	11	7	7
July.....	71	39	63.4	47.2	55.3	2.09	3	6	22	15
August.....	72	35	63.6	47.5	55.6	3.08	6	8	17	16
September.....	73	29	56.1	37.3	46.7	2.68	7	6	17	15
October.....	59	6	42.8	28.0	35.4	3.01	6	5	20	15
November.....	49	1	25.8	12.2	19.0	.03	8	8	14	2
December.....	43	-15	21.2	4.4	12.8	1.11	2	11	18	8

ANNEX CREEK. Latitude 50° 19', longitude 134° 07'. Alaska Gastineau Mining Co., observer.

1921.										
January.....	43	-2	23.8	14.0	18.9	3.08	7	3	21	16
February.....	44	4	31.4	20.9	26.2	9.72	4	2	22	22
March.....	47	5	35.2	24.0	29.6	4.34	12	4	15	14
April.....	60	29	47.2	34.5	40.8	3.40	8	6	16	17
May.....	73	32	55.9	38.7	47.3	5.56	9	3	19	16
June.....	73	39	65.1	45.1	55.1	1.91	10	11	9	13
July.....	70	42	57.3	46.3	51.8	6.46	2	7	22	20
August.....	73	40	60.3	45.0	52.6	7.44	9	5	17	20
September.....	65	34	54.4	41.4	47.9	11.28	7	3	20	22
October.....	55	31	47.1	37.4	42.2	19.53	3	5	23	28
November.....	46	8	34.8	24.8	29.8	6.54	13	3	14	10
December.....	47	10	36.3	25.5	30.9	14.13	5	2	24	19

ATTU. Latitude 52° 56', longitude 173° 13' East. A. B. Somerville, observer.

1921.										
January.....	45	15	33.5	22.4	28.0	8.69	2	15	14	16
February.....	39	14	33.1	24.7	28.9	1.87	0	7	21	7
March.....	43	19	37.0	27.7	32.4	6.00	1	11	19	17
April.....	53	18	39.2	28.0	33.6	4.11	3	8	19	8
May.....	58	27	45.5	33.2	39.4	5.45	4	7	20	16
June.....	55	32	47.4	37.8	42.6	7.02	1	10	19	12

BARROW. Latitude 71° 23', longitude 156° 17'. United States Weather Bureau, observer.

1921.										
January.....	9	-44	-9.8	-26.0	-17.9	0.20	17	13	1	3
February.....	23	-46	-13.0	-25.8	-19.4	.30	18	9	1	5
March.....	6	-41	-8.2	-20.5	-14.4	.13	21	10	0	3
April.....	22	-35	7.6	-12.3	-2.4	.08	25	4	1	2
May.....	36	0	25.2	12.9	19.0	.29	12	19	0	4
June.....	48	12	36.5	28.0	32.2	.30	9	19	2	2
July.....	75	29	50.5	34.1	42.3	.92	12	16	3	8
August.....	64	31	45.5	34.4	40.0	.36	9	14	8	6
September.....	57	12	34.1	26.7	30.4	.56	2	19	9	12
October.....	30	-18	21.7	9.9	15.8	.55	4	23	4	12

Condensed meteorological reports—Continued.

CALDER. Latitude 56° 10', longitude 132° 27'. John McCallum, observer.

Month.	Temperature.					Total precipitation.	Number of days.			
	Maximum.	Minimum.	Mean maximum.	Mean minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1921.	° F.	° F.	° F.	° F.	° F.	Inches.				
January.....	41	17	33.1	24.8	29.0	9.43	8	3	20	18
February.....	45	10	36.8	26.9	31.8	13.43	3	4	21	20
March.....	49	9	39.4	25.2	32.3	4.79	14	2	15	9
April.....	57	25	47.2	32.1	39.6	8.09	4	7	19	21
May.....	75	29	54.2	36.5	45.4	3.81	18	5	8	17
June.....	78	34	63.1	44.3	53.7	6.53	4	9	17	19
July.....	67	38	59.2	46.7	53.0	2.42	4	7	20	15
August.....	77	38	62.1	47.2	54.6	3.61	8	4	19	12
September.....	70	33	57.2	43.0	50.1	13.99	7	4	19	21
October.....	59	32	50.1	40.7	45.4	19.64	2	4	25	27
November.....	50	14	38.0	29.3	33.6	6.69	9	3	18	17
December.....	50	14	37.5	28.1	32.8	17.77	7	6	18	19

CHICKALOON. Latitude 60° 48', longitude 148° 30'. Alaska Engineering Commission, observer.

1921.										
January.....	23	-25	11.8	-7.9	2.0	.....	18	3	10	.....
February.....	40	-24	20.7	-3.3	8.7	.....	17	3	8	2
March.....	43	2	33.9	17.7	25.8	0.79	18	2	11	4
April.....						.48				2
May.....	68	30	56.6	37.3	47.0	.28	12	8	11	4
June.....	74	30	66.9	42.1	54.5	1.23	8	10	12	6
July.....	79	38	66.5	47.7	57.1	2.79	4	11	16	13
August.....	77	36	66.3	46.2	56.2	1.49	10	4	17	11
September.....	68	27	56.2	34.0	45.1	1.83	10	5	15	11
October.....	53	2	41.0	25.4	33.2	2.04	13	10	8	8
November.....	38	0	25.6	7.9	16.8	T.	19	7	4	0
December.....	30	-15	25.0	3.3	14.2	1.91	5	10	16	8

CHITINA. Latitude 61° 32', longitude 144° 27'. A. G. Morey, observer.

1921.										
January.....	39	-43	2.7	-16.8	-7.0	1.93	16	6	9	7
February.....	46	-33	16.5	-3.6	6.4	1.61	11	7	10	8
March.....	44	-16	30.6	8.5	19.6	.24	15	8	8	4
April.....	57	6	44.6	23.2	33.9	.34	14	11	5	4
May.....	69	23	57.0	34.3	45.6	.59	14	9	8	5
June.....	77	35	69.5	44.4	57.0	.69	20	7	3	7
July.....	81	40	64.4	47.6	56.0	1.56	10	6	15	17
August.....	76	35	66.1	45.9	56.0	.85	16	7	8	7
September.....	68	21	58.0	35.9	47.0	.51	10	10	10	9
October.....	60	9	39.8	28.4	34.1	.71	0	11	20	10
November.....	42	-21	10.5	-1.0	4.8	.10	11	9	10	2
December.....	37	-24	14.1	-4.1	5.0	2.36	10	9	12	11

CORDOVA. Latitude 60° 32', longitude 145° 42'. C. R. & N. W. R. R., observer.

1921.										
January.....	40	0	29.1	14.8	22.0	8.12	17	6	8	16
February.....	45	2	34.1	21.7	27.9	17.77	7	3	18	19
March.....	54	12	41.4	24.1	32.8	4.10	11	9	11	10
April.....	54	21	44.6	31.7	38.1	9.69	8	8	14	12
May.....	62	30	53.2	37.0	45.1	6.77	17	6	8	9
June.....	65	36	60.5	45.4	52.9	2.09	12	7	11	13
July.....	63	41	57.9	49.2	53.6	8.85	4	5	22	21
August.....	67	43	60.8	49.8	55.3	4.79	14	8	9	12
September.....	65	35	55.6	44.0	49.8	16.21	12	6	12	17
October.....	54	26	45.0	36.8	40.9	19.45	9	5	17	24
November.....	47	18	36.0	26.8	31.4	5.63	15	6	9	10
December.....	43	13	35.3	24.9	30.1	16.35	12	2	17	21

Condensed meteorological reports—Continued.

DUTCH HARBOR. Latitude 53° 55', longitude 166° 30'. Naval Radio Service, observer.

Month.	Temperature.					Total precipitation.	Number of days.			
	Maximum.	Minimum.	Mean maximum.	Mean minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1921.	° F.	° F.	° F.	° F.	° F.	Inches.				
January.....	40	8	32.2	26.3	29.2	0.69	.....	.....	.....	21
February.....	39	6	30.6	23.4	27.0	10.92	.....	.....	.....	23
March.....	54	19	41.5	33.2	37.4	7.45	.....	.....	.....	27
April.....	46	22	36.6	30.0	33.3	1.47	.....	.....	.....	26
May.....	52	28	45.3	36.0	40.6	6.04	.....	.....	.....	16
June.....	58	36	48.7	40.7	44.7	2.86	.....	.....	.....	15
July.....	67	41	55.2	44.8	50.0	2.65	.....	.....	.....	21
August.....	70	42	60.0	49.7	54.8	1.47	.....	.....	.....	10
September.....	65	33	53.6	43.9	48.8	4.30	.....	.....	.....	19
October.....	53	26	44.4	34.9	38.6	3.38	.....	.....	.....	23
November.....	51	25	43.2	34.2	38.7	2.70	.....	.....	.....	24

EAGLE. Latitude 64° 46', longitude 141° 12'. United States Weather Bureau, observer.

1921.										
January.....	30	-56	-13.4	-28.9	-21.2	0.27	10	9	12	6
February.....	42	-55	-1.3	-21.2	-10.8	.28	11	0	17	6
March.....	41	-40	18.9	-4.6	7.2	.45	12	8	11	5
April.....	52	-7	41.4	15.7	28.6	.69	13	4	13	5
May.....	72	17	56.0	31.5	43.8	.43	11	6	14	8
June.....	83	30	73.4	43.9	58.6	1.13	12	8	10	9
July.....	85	34	74.4	47.4	60.9	1.88	8	7	16	12
August.....	86	31	71.1	41.9	56.5	.61	17	2	12	9
September.....	63	16	49.9	30.3	40.1	1.02	7	6	17	10
October.....	52	1	31.7	21.2	26.4	.52	2	4	25	10
November.....	37	-38	5.8	-6.1	-2	.07	20	4	6	2
December.....	29	-35	10.5	-7.6	1.4	.51	8	6	17	11

FAIRBANKS. Latitude 64° 50', longitude 148° 9'. United States Experiment Station, observer.

1921.										
January.....	23	-56	-7.9	-26.4	-17.2	0.94	16	4	11	13
February.....	47	-42	5.0	-15.9	-5.4	.16	10	9	9	3
March.....	48	-18	27.8	2.5	15.2	3.72	14	4	13	11
April.....	63	-16	43.9	16.9	30.4	T	20	5	5	0
May.....	74	21	57.4	34.3	45.8	.52	13	13	5	4
June.....	83	37	73.1	47.7	60.4	.98	11	13	6	9
July.....	84	38	73.5	49.1	61.3	1.35	6	12	13	10
August.....	87	35	70.8	45.5	58.2	1.08	9	9	13	11
September.....	65	20	51.3	29.4	40.4	1.19	8	7	15	10
October.....	54	-2	32.6	18.9	25.8	2.57	6	3	22	9
November.....	39	-20	13.5	-2.9	5.3	.15	19	8	3	1
December.....	38	-20	13.5	-3.4	5.0	.73	6	3	22	3

FORTMAN HATCHERY. Latitude 55° 40', longitude 131° 25'. Fred Patching, observer.

1921.										
January.....	45	5	34.5	22.5	28.5	10.85	2	4	25	22
February.....	47	2	40.5	24.8	32.6	22.10	5	1	22	19
March.....	53	7	43.6	24.5	34.1	4.80	9	5	17	12
April.....	66	26	53.2	32.4	42.8	6.65	4	8	18	19
May.....	80	31	59.8	38.1	49.0	5.16	8	6	17	20
June.....	82	35	65.4	45.3	55.4	9.42	6	3	21	20
July.....	78	44	64.8	48.2	56.5	4.60	3	7	21	14
August.....	84	42	67.2	50.0	58.6	7.40	6	4	21	18
September.....	72	36	58.9	45.5	52.2	14.61	5	3	22	21
October.....	64	31	51.5	41.5	46.5	30.31	2	2	27	27
November.....	51	11	40.3	28.6	34.4	10.45	9	3	13	19
December.....	49	9	36.1	26.0	31.0	20.87	9	2	20	18

Condensed meteorological reports—Continued.

FORT YUKON. Latitude 65° 34', longitude 145° 16'. Miss Winifred Dalziel, observer.

Month.	Temperature.					Total precipitation.	Number of days.			
	Maxi-mum.	Mini-mum.	Mean maxi-mum.	Mean mini-mum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1921.	° F.	° F.	° F.	° F.	° F.	Inches.				
January.....	3	-64	-27.9	-43.8	-35.8	0.46	17	3	11	4
February.....	14	-63	-11.0	-29.0	-20.0	.03	14	2	12	2
March.....	32	-40	16.5	-8.0	4.2	.46	13	4	13	5
April.....	53	-16	36.6	7.1	21.8	.06	19	3	8	1
May.....	69	18	53.7	30.4	42.0	.65	14	4	13	4
October.....	44	-11	26.6	13.4	20.0	.80	5	6	20	8
November.....	22	-45	-1.7	-20.8	-11.2	.20	21	4	5	4
December.....	37	-46	3.5	-20.9	-8.7	.16	6	10	15	3

No data for June, July, August, and September.

HOLY CROSS. Latitude 62° 12', longitude 159° 45'. Holy Cross Mission, observer.

1921.										
January.....	26	-51	4.2	-11.4	-3.6	.....	10	3	18	.....
February.....	34	-43	4.2	-10.0	-2.9	0.12	20	3	5	2
March.....	38	-10	29.6	10.5	20.0	2.88	14	5	12	9
April.....	48	-8	35.9	16.0	26.0	.26	19	5	6	2
May.....	67	15	49.9	32.8	41.4	.42	15	6	10	3
June.....	78	39	67.0	46.1	56.6	.61	18	3	9	9
July.....	76	34	64.4	46.0	55.2	2.04	9	6	16	10
August.....	73	36	62.1	48.0	55.0	3.23	3	12	16	18
September.....	60	17	51.3	34.0	42.6	1.58	12	10	8	10
October.....	43	5	34.5	22.7	28.6	1.78	11	8	12	8
November.....	46	-12	24.8	12.7	18.8	.41	9	4	17	7

HYDABURG. Latitude 55° 12', longitude 132° 48'. United States Bureau of Education, observer.

1921.										
March.....	52	11	44.6	27.9	36.2	.....	11	7	13	.....
April.....	56	28	46.4	34.1	40.2	8.09	2	10	18	19
May.....	79	31	56.1	38.9	47.5	2.70	6	6	19	16
June.....	74	35	60.0	45.0	52.5	7.98	5	6	19	18
July.....	74	41	62.5	47.7	55.1	2.15	3	13	15	12
August.....	83	40	69.1	48.5	58.8	3.62	9	14	8	13
September.....	.....	38	.....	45.6	.....	12.55	9	13	8	17
October.....	.....	31	.....	37.8	.....	15.59	2	15	14	28
November.....	54	16	45.0	28.3	36.6	4.83	.....	.....	.....	16
December.....	.....	17	.....	24.2	.....	4.60	10	8	13	10

JUNEAU. Latitude 58° 18', longitude 134° 24'. United States Weather Bureau, observer.

1921.										
January.....	41	10	28.3	20.7	24.5	4.13	6	7	18	17
February.....	46	13	35.5	27.3	31.4	8.86	4	2	22	21
March.....	49	9	35.7	25.8	30.8	6.53	11	4	16	17
April.....	58	29	47.9	34.2	41.0	4.03	1	6	23	21
May.....	71	33	55.4	39.1	47.2	6.11	6	4	21	19
June.....	78	39	66.5	46.6	56.6	1.86	5	11	14	10
July.....	73	44	58.7	49.3	54.0	7.09	1	1	29	22
August.....	75	42	60.9	47.7	54.3	7.94	9	1	21	19
September.....	67	35	56.3	44.4	50.4	8.61	2	4	24	21
October.....	58	33	48.7	40.0	44.4	11.56	0	5	26	25
November.....	47	14	36.8	29.4	33.2	5.96	13	4	13	13
December.....	51	20	38.5	30.7	34.6	12.68	6	3	22	22

Condensed meteorological reports—Continued.

KAKE. Latitude 56° 59', longitude 133° 57'. Rev. J. Roscoe Fitzgerald, observer.

Month.	Temperature.					Total precipitation.	Number of days.			
	Maximum.	Minimum.	Mean maximum.	Mean minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1921.	°F.	°F.	°F.	°F.	°F.	Inches.				
January.....	45	10	30.3	23.0	26.6	2.64	9	3	19	14
February.....	45	14	34.7	28.3	31.5	6.63	7	4	17	18
March.....	48	11	33.3	25.7	29.5	2.85	18	4	9	4
April.....	27	-----	32.6	-----	-----	2.41	8	9	13	16
May.....	28	-----	37.3	-----	-----	2.73	13	2	16	14
June.....	37	-----	44.0	-----	-----	3.12	8	6	16	16
July.....	67	43	60.3	47.4	53.8	3.32	4	7	20	13
August.....	69	41	61.2	47.0	54.1	3.31	10	2	19	13
September.....	63	35	55.0	43.6	49.3	6.55	8	3	19	18
October.....	59	31	49.1	40.0	44.6	10.62	4	7	20	26
November.....	53	11	38.3	28.1	33.2	2.36	13	3	14	13
December.....	47	16	37.3	28.9	33.1	8.61	11	2	18	16

KETCHIKAN. Latitude 55° 20', longitude 131° 37'. A. P. Craig, observer.

1921.										
January.....	45	11	36.1	25.8	31.0	11.53	6	5	20	28
February.....	50	11	41.9	27.4	34.6	24.51	8	4	16	21
March.....	53	11	42.9	25.8	34.4	4.37	13	8	10	17
April.....	64	26	49.4	32.4	40.9	6.21	8	9	13	25
May.....	76	29	55.5	37.8	46.6	5.71	11	8	12	25
June.....	76	37	61.9	44.4	53.2	11.23	8	4	18	25
July.....	74	-----	62.5	-----	-----	7.08	12	2	17	17
August.....	82	-----	65.0	-----	-----	8.31	9	9	13	17
September.....	73	40	58.0	46.5	52.2	15.52	7	1	22	24
October.....	65	33	52.0	42.1	47.0	30.33	4	6	21	30
November.....	52	14	41.8	30.7	36.2	16.58	11	3	16	21
December.....	54	14	38.3	29.7	34.0	20.45	11	1	19	26

KODIAK. Latitude 57° 48', longitude 152° 22'. United States Experiment Station, observer.

1921.										
January.....	44	2	28.9	18.0	23.4	1.32	2	17	12	5
February.....	40	2	33.2	20.9	27.0	4.19	5	6	17	13
March.....	49	22	42.0	30.2	36.1	.54	8	14	9	3
April.....	50	18	40.9	30.0	35.4	4.47	6	6	18	13
May.....	61	30	50.0	35.5	42.8	1.02	13	10	8	6
June.....	67	39	54.5	43.1	48.8	6.62	4	8	18	14
July.....	63	39	56.8	46.6	51.7	3.16	6	7	18	12
August.....	69	42	59.7	48.3	54.0	7.67	7	12	12	15
September.....	68	36	56.4	43.1	49.8	4.38	4	13	13	11
October.....	59	28	50.5	36.0	43.2	5.15	0	9	22	12
November.....	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
December.....	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

LATOCHE. Latitude 60° 03', longitude 147° 55'. Kennecott Copper Corporation, observer.

1921.										
January.....	41	13	31.4	21.5	26.4	8.50	6	7	18	11
February.....	44	16	36.0	27.0	31.5	17.95	1	6	21	17
March.....	51	20	40.8	29.6	35.2	6.65	7	4	20	14
April.....	59	23	46.5	32.0	39.2	16.31	11	3	16	17
May.....	65	32	55.5	36.9	46.2	4.76	20	2	9	9
June.....	-----	-----	-----	-----	-----	1.79	23	3	4	-----
July.....	65	46	59.2	49.2	54.2	11.15	8	3	20	18
August.....	73	41	63.0	50.1	56.6	6.36	14	6	11	11
September.....	71	35	58.7	45.0	51.8	21.39	15	4	11	15
October.....	58	29	49.4	38.6	44.0	18.57	14	2	15	18
November.....	48	25	42.3	31.0	36.6	10.81	3	10	15	14

Condensed meteorological reports—Continued.

MATANUSKA. Latitude 61° 33', longitude 149° 15'. United States Experiment Station, observer.

Month.	Temperature.					Total precipitation.	Number of days.			
	Maximum.	Minimum.	Mean maximum.	Mean minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1921.	° F.	° F.	° F.	° F.	° F.	Inches.				
January.....	35	-26	14.0	-4.8	4.6	0.83	8	6	17	5
February.....	47	-27	21.9	2.8	12.4	.08	12	1	15	1
March.....	47	1	35.7	17.8	26.8	.75	17	4	10	4
April.....	57	12	45.5	26.9	36.2	1.25	16	3	11	2
May.....	69	23	58.1	33.2	45.6	.81	18	3	10	5
June.....	76	36	69.0	43.6	56.3	1.10	10	7	13	5
July.....	77	39	64.8	46.9	55.8	1.57	8	7	16	11
August.....	72	38	63.1	47.1	55.1	3.93	5	10	16	15
September.....	66	28	54.9	37.7	46.3	1.80	6	7	17	14
October.....	52	8	39.9	27.6	33.8	3.57	3	6	22	14
November.....	48	-3	26.1	11.7	18.9	.04	16	8	6	1
December.....	42	-11	23.1	5.4	14.2	2.26	10	6	15	14

NENANA. Latitude 64° 31', longitude 149° 6'. Alaska Engineering Commission, observer.

1921.										
January.....	25	-57	-1.8	-27.2	-14.5	0.31	12	3	16	5
February.....	31	-43	3.5	-18.5	-7.5	.09	12	6	10	2
March.....	48	-30	24.5	-0.1	12.3	2.24	14	3	14	12
April.....	50	-21	39.4	16.5	28.0	.10	16	9	5	3
May.....	73	23	56.3	35.0	45.6	.53				3
June.....	79	39	71.5	48.5	60.0	1.32				8
July.....	81	42	72.5	50.5	61.5	1.45	7	12	12	11
August.....	84	35	70.3	47.6	59.0	1.88				12
September.....	63	19	49.6	31.0	40.3	1.27	8	3	19	7
October.....	52	-2	30.9	18.3	24.6	2.32	1	7	23	11
November.....	35	-23	17.8	2.0	9.9	0	14	10	6	0
December.....	39	-20	18.7	-1.4	8.6	.45	9	6	16	5

NOME. Latitude 64° 30', longitude 165° 24'. United States Weather Bureau, observer.

1921.										
January.....	25	-29	8.0	-7.1	0.4	2.22	10	5	16	12
February.....	32	-36	5.8	-11.0	-2.6	.44	15	4	9	4
March.....	34	-18	20.2	5.8	13.0	1.70	2	5	24	12
April.....	38	-10	24.7	8.5	16.6	.42	12	6	12	6
May.....	53	10	40.4	28.3	34.4	.90	12	5	14	8
June.....	76	28	51.5	37.6	44.6	.86	13	10	7	6
July.....	71	36	55.6	44.3	50.0	1.67	8	3	20	12
August.....	64	40	56.9	49.8	53.4	5.15	1	11	19	26
September.....	55	24	46.0	32.2	39.1	1.60	11	8	11	10
October.....	40	8	32.0	20.0	26.0	1.19	11	7	13	10
November.....	36	-2	28.2	20.0	24.1	.86	12	3	15	8
December.....										

NOORVIK. Latitude 66° 50', longitude 161° 00'. United States Weather Bureau, observer.

1921.										
January.....	16	-44	-2.2	-18.6	-10.4	1.29	10	5	16	13
February.....	28	-47	-4.2	-19.6	-11.9	.33	13	5	10	6
March.....	34	-27	12.9	-3.5	4.7	1.26	11	8	12	13
April.....	41	-16	25.0	4.2	14.6	.20	19	4	7	6
May.....	62	12	46.6	27.6	37.1	.45	14	7	10	4
June.....	84	30	63.7	39.3	51.5	.37	20	7	4	5
July.....	87	40	68.4	47.9	58.2	1.21	6	13	12	9
August.....	85	38	63.6	48.8	56.2	2.93	5	5	21	19
September.....	60	18	46.0	29.5	37.8	.82	15	5	10	9
October.....	36	-14	25.4	12.6	19.0	1.12	7	3	21	9

Condensed meteorological reports—Continued.

NULATO. Latitude 64° 43', longitude 158° 4'. Dr. H. C. Randle, observer.

Month.	Temperature.					Total precipitation.	Number of days.			
	Maximum.	Minimum.	Mean maximum.	Mean minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1921.	° F.	° F.	° F.	° F.	° F.	Inches.				
January.....	20	-49	-5.3	-23.9	-14.6	2.12	16	2	13	12
February.....	28	-45	2.1	-17.9	-7.9	.15	13	7	8	5
March.....	35	-26	21.0	1.0	11.0	4.64	10	6	15	16
April.....	44	-16	31.9	7.5	19.7	.41	18	5	7	2
May.....	60	9	48.5	29.3	38.9	.29	11	7	13	4
June.....	78	31	66.6	41.3	54.0	1.22	9	14	7	8
July.....	77	35	65.6	46.8	56.2	1.37	9	14	8	13
August.....	80	34	64.1	48.0	56.0	2.18	5	9	17	15
September.....	60	7	46.4	25.2	35.8	2.03	14	5	11	9
October.....	36	-9	27.6	16.5	22.0	2.01	9	3	19	13
November.....	33	-25	15.0	2.8	8.9	.42	12	6	12	7
December.....	34	-32	10.6	-8.8	1.1	1.93	7	5	19	17

RUBY. Latitude 64° 43', longitude 155° 29'. Northern Commercial Co., observer.

1921.										
January.....	20	-52	-10.5	-29.4	-20.0	0.77	14	5	12	5
February.....	28	-49	-2.6	-19.5	-11.0	.48	14	7	7	7
March.....	40	-23	22.1	.9	11.5	2.25	5	10	16	9
April.....	51	-22	36.6	8.0	22.3	.20	19	4	7	2
May.....	65	8	51.4	28.5	40.0	1.03	16	10	5	6
June.....	82	32	69.2	42.4	55.8	1.03	14	12	4	7
July.....	78	36	69.7	47.1	58.4	1.83	6	13	12	12
August.....	83	35	66.6	45.9	56.2	2.42	5	9	17	20
September.....	62	7	47.3	25.5	36.4	2.43	15	5	10	10
October.....	40	-10	27.8	15.1	21.4	1.21	4	2	25	10
November.....	32	-30	13.4	1.6	7.5	.14	13	7	10	4

RAMPART. Latitude 65° 30', longitude 150° 15'. United States Experiment Station, observer.

1921.										
January.....	5	-55	-18.8	-36.7	-27.8	0.40	15	4	12	5
February.....	21	-54	-5.2	-21.8	-13.5	.23	11	2	15	3
March.....	41	-35	15.9	-7.2	4.4	1.42	6	7	18	9
April.....	46	-22	33.9	7.4	20.6	.01	15	9	6	1
May.....	67	16	53.5	31.8	42.6	.17	13	8	10	4
June.....	79	36	69.9	45.4	57.6	1.08	7	10	13	12
July.....	88	37	74.8	48.4	61.6	.96	13	11	7	12
August.....	88	35	69.2	46.4	57.8	2.55	12	6	13	13
September.....	69	17	45.9	27.0	36.4	.53	13	2	15	7
October.....	45	-3	26.0	16.8	21.4	1.21	1	3	27	8
November.....	22	-19	4.0	-5.4	-7	.04	16	5	9	1
December.....	37	-27	8.1	-5.5	1.3	1.15	9	8	14	8

SEWARD. Latitude 60° 10', longitude 149° 26'. Alaska Engineering Commission, observer.

1921.										
January.....	37	-5	25.2	10.7	18.0	2.70	16	6	9	8
February.....	45	-2	29.9	14.4	22.2	2.66	12	1	15	12
March.....	45	3	38.6	25.0	31.8	2.40	12	3	16	8
April.....	55	18	42.6	28.5	35.6	6.73	11	4	15	12
May.....	65	29	54.3	36.7	45.5	1.19	17	5	9	4
June.....	71	38	62.4	43.3	52.8	.61	14	3	13	4
July.....		40		46.3		2.45	7	2	22	9
August.....	73	39	61.6	47.9	54.8	3.38	10	6	15	12
September.....	64	32	55.5	42.0	48.8	15.28	9	5	16	13
October.....	52	23	44.2	33.5	38.8	13.40	11	4	16	14
November.....	49	12	37.9	25.7	31.8	2.39	11	5	14	6
December.....	41	8	33.7	13.8	26.8	7.85	14	1	16	15

Condensed meteorological reports—Continued.

SITKA. Latitude 57° 04', longitude 135° 20'. United States Weather Bureau, observer.

Month.	Temperature.					Total precipitation.	Number of days.			
	Maxim.	Minim.	Mean maxim.	Mean minim.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1921.	° F.	° F.	° F.	° F.	° F.	Inches.				
January.....	45	11	36.5	25.5	31.0	6.39	6	10	15	19
February.....	49	17	40.5	29.6	35.0	8.44	4	4	20	21
March.....	52	10	40.6	27.1	33.8	7.52	11	6	14	19
April.....	58	28	47.9	33.3	40.6	4.94	3	11	16	19
May.....	72	30	52.0	37.9	45.0	5.46	8	4	19	18
June.....	74	38	61.9	45.2	53.6	2.16	6	10	14	19
July.....	77	43	59.8	48.5	54.2	3.84	1	4	26	23
August.....	72	42	62.9	49.2	56.0	5.73	6	7	18	20
September.....	68	40	59.2	46.4	52.8	7.78	5	6	19	22
October.....	62	34	51.9	40.9	46.0	15.65	1	9	21	26
November.....	54	17	44.7	29.8	37.2	7.00	15	1	14	13
December.....	54	22	41.5	31.2	36.4	12.45	4	6	21	21

ST. PAUL ISLAND. Latitude 57° 15', longitude 170° 10'. United States Weather Bureau, observer.

1921.										
January.....	35	- 5	27.9	19.6	23.8	1.61	3	12	16	24
February.....	38	-11	21.4	11.8	16.6	.65	0	9	19	17
March.....	37	11	31.8	24.3	28.0	2.02	2	3	26	18
April.....	36	6	28.7	20.0	24.4	1.10	2	6	22	15
May.....	44	28	38.3	31.2	34.8	.42	1	8	22	12
June.....	53	31	45.9	35.8	40.8	1.20	0	11	19	19
July.....	53	38	47.8	41.4	44.6	3.59	1	4	26	24
August.....	54	41	50.0	44.2	47.1	4.19	0	3	28	28
September.....	52	34	47.8	41.0	44.4	2.68	1	14	15	25

SKAGWAY. Latitude 59° 27', longitude 135° 19'. F. J. Vandewall, observer.

1921.										
January.....	41	0	23.2	13.0	18.1	0.82	10	5	16	4
February.....	43	6	29.9	19.6	24.8	1.50	5	3	20	15
March.....	45	6	34.4	23.8	29.1	.70	13	5	13	4
April.....	57	23	50.8	32.0	41.4	.71	4	12	14	11
May.....	77	30	59.2	39.3	49.3	1.10	9	9	13	6
June.....	81	32	70.6	42.0	56.3	1.03	13	8	9	10
July.....	74	37	64.3	49.1	56.7	.87	2	4	25	12
August.....	79	36	65.8	46.3	56.0	1.94	8	6	17	14
September.....	67	26	59.0	41.6	50.3	2.15	7	4	19	13
October.....	64	24	49.8	36.6	43.2	3.52	4	6	21	16
November.....	48	7	32.9	23.5	28.4	.89	15	3	12	6
December.....	46	9	38.5	26.5	32.5	2.86	5	5	21	12

TALKEETNA. Latitude 62° 19', longitude 150° 16'. Alaska Engineering Commission, observer.

1921.										
January.....	25	-33	11.5	- 8.1	1.7	0.77	10	11	10	5
February.....	46	-33	22.6	- 2.3	10.2	.....	12	8	8	8
March.....	45	- 9	34.0	13.8	23.9	.....	9	9	13	6
April.....	58	- 3	45.9	20.5	33.2	.....	15	4	11	.....
May.....	68	21	58.0	29.7	43.8	.....	9	9	13	.....
June.....	79	33	71.4	41.9	56.6	.....	10	6	14	.....
July.....	83	32	66.9	46.6	56.8	.....	6	7	18	.....
August.....	77	30	67.3	47.7	57.5	.....	5	2	24	.....
September.....	67	25	55.0	35.4	45.2	2.42	8	4	18	13
October.....	52	0	40.4	23.8	32.1	8.91	10	3	18	13
November.....	43	- 6	25.8	7.9	16.8	0	14	8	8	0
December.....	36	-19	20.9	2.5	11.7	2.24	5	3	23	8

Condensed meteorological reports—Continued.

TANANA. Latitude 65° 10', longitude 152° 06'. United States Weather Bureau, observer.

Month.	Temperature.					Total precipitation.	Number of days.			
	Maxi- mum.	Mini- mum.	Mean maxi- mum.	Mean mini- mum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1921.	° F.	° F.	° F.	° F.	° F.	Inches.				
January.....	6	-52	-12.8	-32.8	-22.8	1.38	16	5	10	15
February.....	20	-49	4.6	-21.5	-8.4	.46	6	16	6	8
March.....	35	-35	18.7	-4.0	7.4	2.90	9	7	15	20
April.....	49	-26	36.2	10.8	23.5	.14	21	5	4	5
May.....	67	19	32.3	31.3	41.8	1.48	11	8	12	8
June.....	81	36	70.7	45.1	57.9	.83	8	15	7	15
July.....	83	34	71.5	47.2	59.4	.93	4	11	16	13
August.....	86	31	67.9	43.7	55.8	2.63	2	7	22	10
September.....	64	13	47.1	25.7	36.4	1.91	10	7	13	10
October.....	40	-4	26.8	15.6	21.2	.76	3	9	19	9
November.....	32	-14	10.8	.7	5.8	.07	14	11	5	4
December.....	34	-25	10.5	-5.0	2.8	.70	2	9	20	17

VALDEZ. Latitude 61° 7', longitude 146° 16'. United States Weather Bureau, observer.

1921.										
January.....	36	-14	23.9	9.1	16.5	4.91	15	1	15	12
February.....	41	-6	27.0	13.0	20.0	6.02	7	3	18	17
March.....	44	2	34.9	18.0	26.4	3.25	13	3	15	13
April.....	54	16	43.8	26.8	35.3	3.00	9	6	15	13
May.....	63	23	54.2	34.9	44.6	1.62	14	7	10	8
June.....	69	35	61.5	43.1	52.3	1.92	8	7	15	9
July.....	65	38	58.2	46.4	52.3	4.79	4	3	24	20
August.....	69	39	61.0	45.9	53.4	2.76	8	7	16	15
September.....	69	30	54.2	38.3	46.2	5.89	5	7	18	20
October.....	53	13	42.3	31.1	36.7	6.87	7	6	18	21
November.....	39	7	29.8	18.1	24.0	1.67	13	7	10	4
December.....	46	5	29.9	16.4	23.2	7.90	9	3	19	17

WISEMAN. Latitude 67° 27', longitude 150° 10'. Northern Commercial Company, observer.

1921.										
January.....	10	-56	-15.7	-31.7	-23.7	.....	24	4	3	.....
February.....	25	-52	-3.6	-22.1	-12.8	.....	21	5	2	.....
March.....	30	-41	11.4	-14.4	-1.5	.....	19	5	7	.....
April.....	41	-19	33.0	4.5	18.8	0.43	24	4	2	3
May.....	60	8	49.7	27.6	38.6	.12	17	8	6	5
June.....	78	34	67.3	42.4	54.8	.12	13	13	4	5

WRANGELL. Latitude 56° 28', longitude 135° 19'. E. F. Grigwire, observer.

1921.										
January.....	42	9	32.5	24.1	28.3	6.11	14	1	16	16
February.....	48	16	38.5	28.9	33.7	10.31	9	2	17	19
March.....	50	13	40.6	27.8	34.2	2.43	21	3	7	6
April.....	58	30	50.8	35.4	43.1	3.17	14	5	11	11
May.....	76	32	57.7	40.8	49.2	5.32	10	11	10	18
June.....	79	39	66.5	47.2	56.8	2.18	11	5	14	12
July.....	74	45	63.4	49.4	56.4	4.08	11	3	17	12
August.....	.....	42	.....	50.7	.....	6.79	11	2	18	13

YAKUTAT. Latitude 59° 33', longitude 139° 44'. E. M. Axelson, observer.

1921.										
January.....	41	10	30.4	21.2	25.8	8.41	9	2	20	10
February.....	43	19	35.5	28.0	31.8	10.09	4	0	24	20
March.....	41	13	36.0	25.4	30.7	4.88	11	0	20	13
April.....	55	27	43.6	31.8	37.7	5.53	8	9	13	19
May.....	59	30	49.0	35.8	42.4	8.26	8	4	19	14
June.....	70	37	58.1	43.5	50.8	3.38	9	8	13	11
July.....	61	40	57.0	48.8	52.9	12.06	3	4	24	16
August.....	65	43	58.1	48.0	53.0	5.34	9	4	17	12
September.....	59	37	54.6	44.0	49.3	10.38	9	6	15	12
October.....	53	30	46.5	36.5	41.5	13.72	2	6	23	23
November.....	47	19	37.6	27.7	32.6	6.87	15	3	12	9



